CyberResearch

Remote/Modular Data Acquisition

CyMOD™ Series
CM 4510
CM 4520
CM 4531
CM 4530

CM 4510: RS-422/485 Repeater Module

CM 4520: RS-232 to RS-485 Converter

CM 4531: RS-422/485 to RS-232 Remote Serial Device

CM 4530: USB to RS-232/422/485 Converter

USER'S MANUAL

VER. 3 • OCT 2002

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Introduction

1.1   What is **CYMOD**?

CYMOD is a series of data acquisition modules. It provides a total solution of the data acquisition network and control system. You can remotely control up to 256 CYMOD modules on RS-485 netowrk. All you need is to use a host computer, like a PC (Personal Computer), with one RS-232 serial port for controlling the whole system. The maximum communication distance is 4000 feet from the host computer.

CYMOD is based on the RS-485 multi-drop network system, each module has an unique address ID. Using simple ASCII command & response protocol through standard RS-485 interface can control all the CYMOD modules in the RS-485 network.

The CYMOD modules provide direct linkage to a wide variety of sensors and perform all signal conditioning, scaling, linearization and conversion. The modules can be used to measure temperature, pressure, flow, voltage, current and numerous types of digital signals.

1.2 Outstanding Features of **CYMOD**

- **Industry standard networking**

All CYMOD modules use the RS-485 communication protocol for transmitting and receiving at high rates and over long distance.

- **Two-wire and multi-drop communication**

A single twisted pair of wires is used to transmit and receive data between modules. Multi-drop capability makes system configuration more flexible and makes it easy to set up a network.

- **High transfer speed**

CYMOD modules provide up to 115.2K bps data / command transfer rate, which can promote system bandwidth.

- **Simple command / response protocol**

All communications are performed with printable ASCII characters. This allows the information to be processed with string functions common to the most high-level languages.

- **Industrial design**

The screw terminal plug connectors on every CYMOD module ensure simple installation and easy modification. The compact size allows the modules to be mounted on DIN rail, back-panel wall-mount, etc.

- **Watch-dog supervisory**

CYMOD contains a watch-dog supervisory circuitry that will automatically reset the module when the system fails. In addition, a user-programmable software timer provides a "safe" output signal in the event of host computer failure.

- **High isolation voltage**

CYMOD provides photo-isolators, which ensure high isolation voltage between the data acquisition circuits and the communication port. The fatal electric-shock won' t go through and damage all the modules on the network.

- **Noise immunity**

The CYMOD provide extra noise immunity capability. An electrode, which is coated inside the ABS case, can reduce electro-magnetic interference (EMI) and noise.

- **Harsh environmental protection**

A surface coating covers on the PCB and electronic components of the CYMOD. It allows superior resistance to harsh environment such as humidity, salt spray and most harsh chemicals.

1.3 **CYMOD 4000 S**eries products overview

The CYMOD 4000 series provides the complete sets of data acquisition modules, including communication modules, analog input modules, analog output modules, and digital I/O modules.

- **Communication Module**
  - CM 4510: RS-422/RS-485 Repeater
  - CM 4520: RS-232 to RS-422/RS-485 Converter
  - CM 4530: USB to RS-422/RS-485 Converter
  - CM 4531: Addressable RS-422/RS-485 to RS-232 Converter
- **Analog Input Modules**
  - CM 4011: Multifunction High Gain Analog Input Module(with DI/O)
  - CM 4011D: Multifunction High Gain Analog Input with 5 ½digit LED Display(with DI/O)
  - CM 4012: Analog Input Module(with DI/O)
  - CM 4012D: Analog Input Module with 5 1/2 digit LED Display(with DI/O)
  - CM 4013A: 3-channel RTD Input Module
  - CM 4014D: Analog (Transmitter) Input Module with 5 1/2digit LED Display
  - CM 4017: 8-channel Analog Input Module
  - CM 4018: 8-channel Thermocouple Input Module
- **Analog Output Modules**
  - CM 4021: Single Channel Analog Output Module
  - CM 4024: 4-channel Analog Output Module(with DI)
- **Digital I/O Modules**
  - CM 4050: Module with 7 DI channels and 8 DO channels
  - CM 4052: Isolated Digital Input Module
  - CM 4053: 16-channel digital Input Module
  - CM 4054: 15-channel digital Input Module
  - CM 4056: 15-channel digital Output Module

- ♦ CM 4058: 28-channel programable digital I/O Module
- ♦ CM 4060: 4-channel Relay Output & Digital Input Module
- ♦ CM 4063: 8-channel Relay Output Module
- ♦ CM 4080: Counter/Frequency Input Module

1.4   EIA RS-485 Standard

The EIA RS-485 interface is a communication standard developed for multi-dropped systems that can communicate at high rate over long distance. The standard RS-485 can operate at speed up to 10 M bps over cable length up to 4000 feet.

The RS-485 interface can support up to 32 drivers/receivers on the same line. This allows actual networking applications on a parity line system (sometimes called multi-drop).

The RS-485 uses differential transmission on a balance line. Its easy wiring make it popular to use in industrial applications.

1.5   RS-485 on **CYMOD**

The CYMOD improves the RS-485 capability for minimizing the user's cost. On each CYMOD module, a half-duplex RS-485 transceiver is used to communicate with other modules. A single twisted pair of wires, which provides standard differential transmission, is used to transmit and receive data between modules. The high input impedance of each CYMOD receiver allows up to **128** CYMOD modules on the same RS-485 bus without using a signal repeater.

The maximum transfer rate of CYMOD is 115.2Kbps which is lower than the maximum speed of the RS-485 standard. The slew-rate limiter on every RS-485 transceiver of CYMOD is very useful for transmitting error-free data, minimizing EMI, and reducing reflections caused by improperly terminated cables.

The CYMOD on a network may not use the same power supply. Therefore, the voltage difference between ground of the modules may exist.

Excessive output current and power dissipation caused by faults or by bus contention are prevented by the current limiter and the thermal shutdown circuitry inside the CYMOD.

1.6 **CYMOD** RS-485 Network Configurations

CYMOD 400 Series is designed under RS-485 multi-drop network architecture. Up to 256 CYMOD modules can be controlled in a multi-drop network. The limit of 256 is due to command code. The network can be connected by simple topology (Figure 1-1) or branch topology (Figure 1-2) or free topology (Figure 1-3).

The CM 4520 and CM 4510 are the two basic communication modules to construct a RS-485 network. The CM 4520 is a RS-232 to RS-485/RS-422 converter. The CM 4520 is used to build a RS-485 port for the host computer by converting standard RS-232 signal into RS-485 signal.

The CM 4510 is the RS-485 signal repeater which is used to extend or to lengthen the network distance. A CYMOD bus can connect up to 256 modules, each segment is up to 128 modules. Whenever the numbers of the modules excess 128, the repeater should be used. In addition, the length of a standard RS-485 bus is up to 4000 feet, the repeater should be used whenever the length of a signal bus is more than 4000 feet.

The CM 4530 is the USB to RS-485/RS-422/RS-232 converter, and it used to build the USB signal into RS-485/RS-422/RS-232 signal.

The CM 4524 is an addressable RS-485/RS-422 to RS-232 converter, it allows the RS-232 devices to easily link to the Host by the RS-485/422 bus.
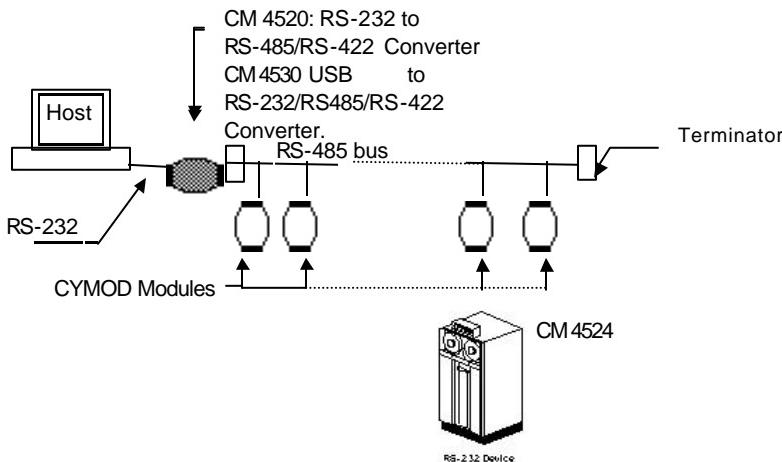
Figure 1-1 Simple Topology

CM 4520: RS-232 to
RS-485/RS-422 Converter
CM 4530:   USB   to
RS-232/RS485/RS-422
Converter.

Host

RS-232

RS-485 bus

CM 4520
Repeater

RS-485 bus

Terminator

CYMOD Modules

CM 4531

RS-232 Device
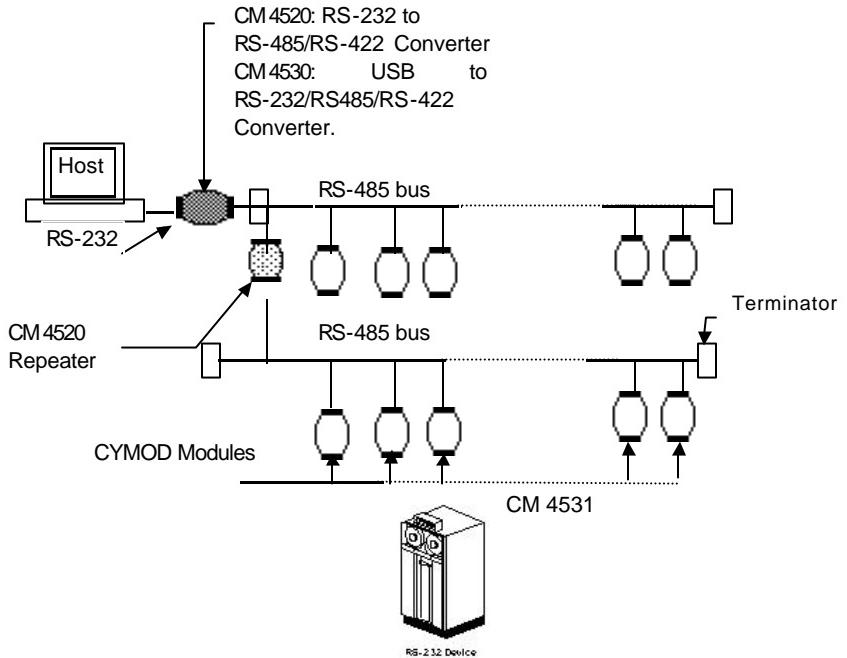
Figure 1-2 Branch Topology

CM 4520: RS-232 to RS-485/RS-422 Converter
CM 4530: USB to RS-232/RS485/RS-422 Converter.

CYMOD Modules

Terminator

Host

RS-485 bus

CM 4510 Repeater

CM 4510 Repeater

Terminator

CM 4531

RS-232 Device

CYMOD I/O modules

CYMOD I/O modules

Terminator
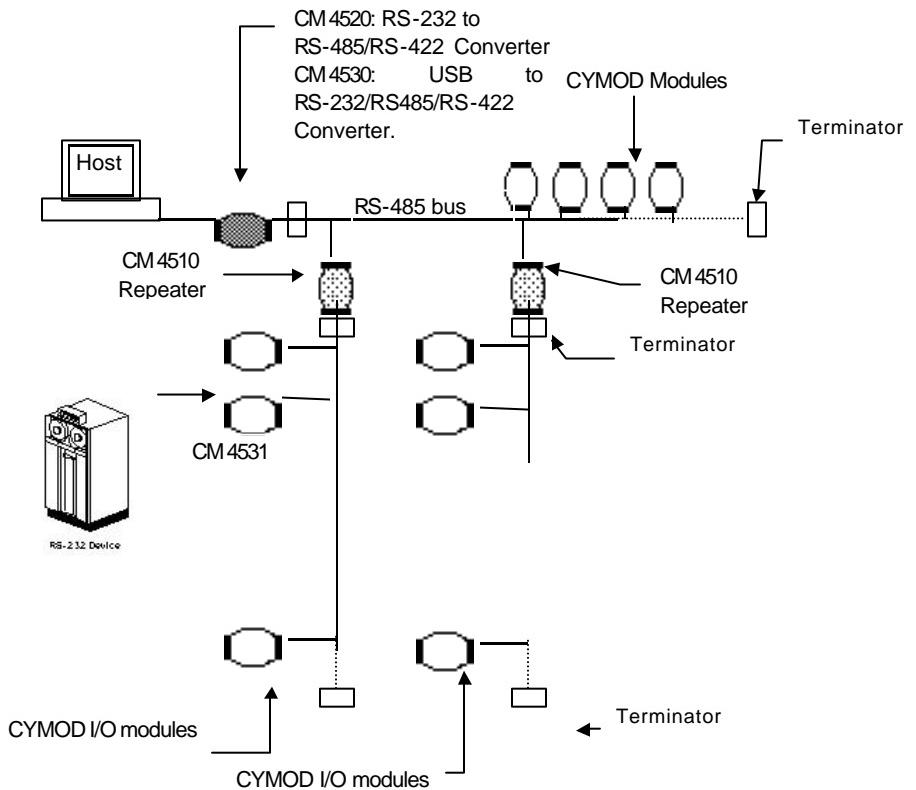
Figure 1-3 Free Topology

1.7   Constructing a **CYMOD** Network

1. Set up a CM 4520 or CM 4530.

2. Connect the host computer with the CM 4520 or CM 4530.

3. Set up one or more CM 4510 if necessary.

4. Connect the CM 4510 to extend to RS-485 bus if necessary.

5. Install the CYMOD utility software or CM 4530 driver from disk.

6. Initialize the brand-new CYMOD modules.

7. Add the new CYMOD modules into RS-485 network.

Refer to chapter 2 and chapter 4 for executing step 1 and 2. Refer to chapter 3 for executing step 3. Chapter 4 explains the best time to install CM 4510. The information about the software for operating the CYMOD is in chapter 6. For executing step 6 and step 7, please refer to the install procedures of each module along with chapter 6, "Software Utility."

1.8   Termination Bus

In order to avoid signal reflections on the bus, each bus segment has to be blanked off at its physical beginning and at its end with the characteristic impedance. A termination resister (Rt) is intalled for this purpose. The Rt value - $120\Omega \pm 2\%$ is recommended, and the detailed connection of Rt can be referred from the " Terminator Connection" diagram below.
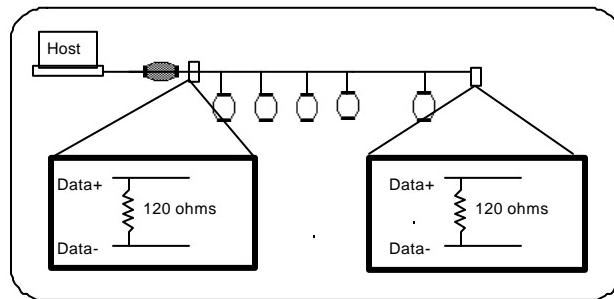
Terminator Connection

1.9. Shielding

In case of increased interference, shielded bus cables are recommended for both intra and inter-module wiring . In addition, shielding should also be employed for power supply and signal cables.

Shielding   Recommendations:

1. The shield should be connected with protective grounding at each bus connection.

2. The shield should be applied several times along the course of the cable.

3. The shield should be applied directly to the computer, or to separate shield rails.
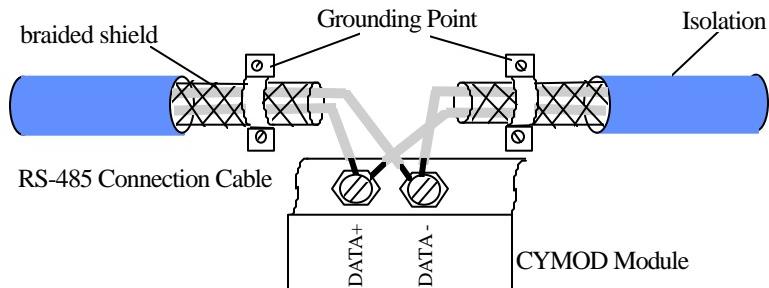
1.10. How to Calculate Checksum Value

Format of CYMOD Commands

(LeadingCode)(Addr)(Command)(Data)**[Checksum]**<CR>

When checksum is enable then [Checksum] is needed, it is 2-character.

[Checksum] = ((LeadingCode)+(Addr)+(Command)+(Data)**) MOD 0x100**

Example 1: checksum is **disabled**

User Command :	$012<CR>
Response :	!01400600

Example 2: checksum is **enabled**

User Command :	$012**B7**<CR>
Response :	!01400600**AC**

‘ $' = 0x24   ‘ 0' = 0x30   ‘ 1' = 0x31   ‘ 2' = 0x30

B7 = (0x24 + 0x30 + 0x31 + 0x32 **) MOD 0x100**

‘ !' = 0x24   ‘ 0' = 0x30   ‘ 1' = 0x31   ‘ 4' = 0x34

‘ 6' = 0x36

AC= **(** 0x24+ 0x30+ 0x31+ 0x34+ 0x30+ 0x30+ 0x36+ 0x30+ 0x30**) MOD 0x100**

CYMOD 4520

2.1. Overview

What is CYMOD 6520 ?

CYMOD 4520 is a RS-232 to RS-422/RS-485 converter, it converts the RS-232 signal to the RS-422/RS-485 signals. The CM 4520 can be considered an extension RS-422/RS-485 serial port for the host computer. A standard 9-pin D-type connector is used to connect the host computer and the CM 4520. Hence, the CM 4520 can connect with all kinds of PCs, IPCs or Notebook PCs, which employ a standard RS-232 interface.

◆ **Features of CYMOD 4520**
- ♦ RS-422/RS-485 transceiver
- ♦ Differenial 2-wire half-duplex RS-485
- ♦ Easy setup and installation
- ♦ Auto direction flow control
- ♦ Maximum 128 CYMOD on a bus without using repeaters
- ♦ Maximum 256 addressable CYMOD modules
- ♦ High transfer speed
- ♦ High isolation voltage
- ♦ Lower power consumption

Specifications of CYMOD 4520

◆ **Input**

  ♦ Interface : standard RS-232 9-pin female D-type connector
  ♦ Speed (bps) : 1200(115.2K[1]), 2400, 4800, 9600, 19.2K, 38.4K, RTS
  ♦ Data Format : 9 bits, 10 bits, 11 bits, or 12 bits

◆ **Output**

  ♦ Interface :RS-485, differential, 2 half-duplex wires RS-422, differential, 4 full-duplex wires
  ♦ Speed (bps) : 1200(115.2K[1]), 2400, 4800, 9600, 19.2K, 38.4K, RTS
  ♦ Max RS-485 network bus distance : 4000 ft. (1200m)

◆ **Isolation**

  ♦ Isolation voltage : 5000 Vrms(between RS-422/RS-485 network and host computer)

◆ **Bus**

  ♦ Max loading : 128 CYMODs on a RS-485 network
  ♦ Max modules : 256 CYMODs with one CM 4510 repeater

◆ **Power**

  ♦ Power Supply : +10V to +30V
  ♦ Power Consumption : 0.95 W

Note 1: 115.2K is supported by Firmware version A1.2 or later.

A Look at CYMOD 4520 & Pin Assignment
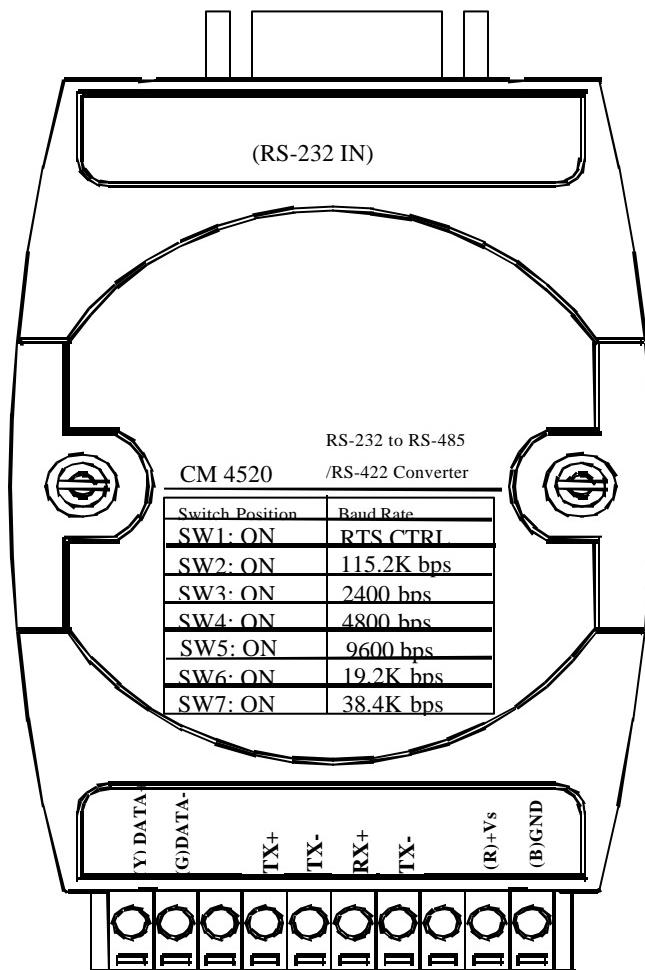
RS-232 to RS-485 /RS-422 Converter

(RS-232 IN)

CM 4520

Switch Position	Baud Rate
SW1: ON	RTS CTRL
SW2: ON	115.2K bps
SW3: ON	2400 bps
SW4: ON	4800 bps
SW5: ON	9600 bps
SW6: ON	19.2K bps
SW7: ON	38.4K bps

Y) DATA+ G)DATA-   TX+ TX- RX+ TX-   (R)+Vs (B)GND

Pin Definitions

Pin #	Signal Name	Description
1	(Y)DATA+	RS-485 transmission line, positive
2	(G)DATA-	RS-485 transmission line, negative
4	TX+	RS-422 transmission line, positive
5	TX-	RS-422 transmission line, negative
6	RX+	RS-422 receiving line, positive
7	RX-	RS-422 receiving line, negative
9	(R)+VS	CYMOD power supply, +10V~+30V
10	(B)GND	CYMOD ground
--	RS-232 IN	9-pin RS-232 connector

Connection Between Host and CM 4520

Functional Block Diagram

TVS : Transient Voltage Suppresser

PTC : Positive Temperature Coefficient
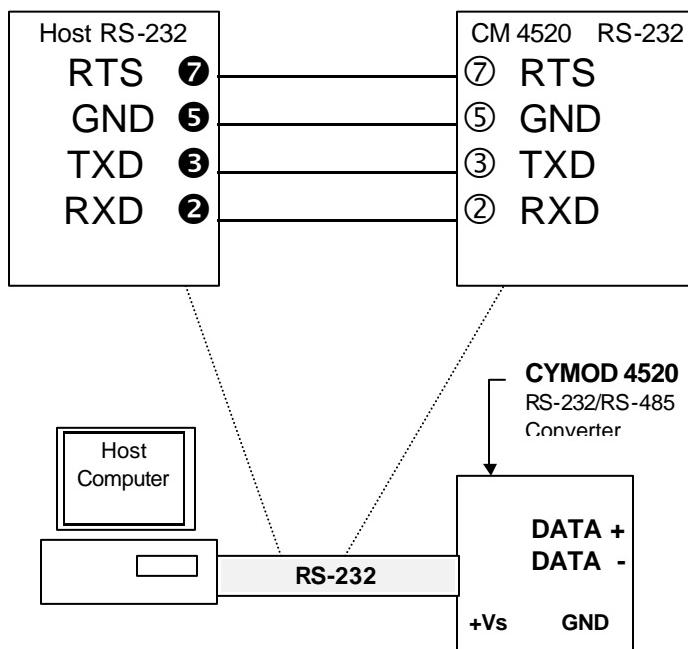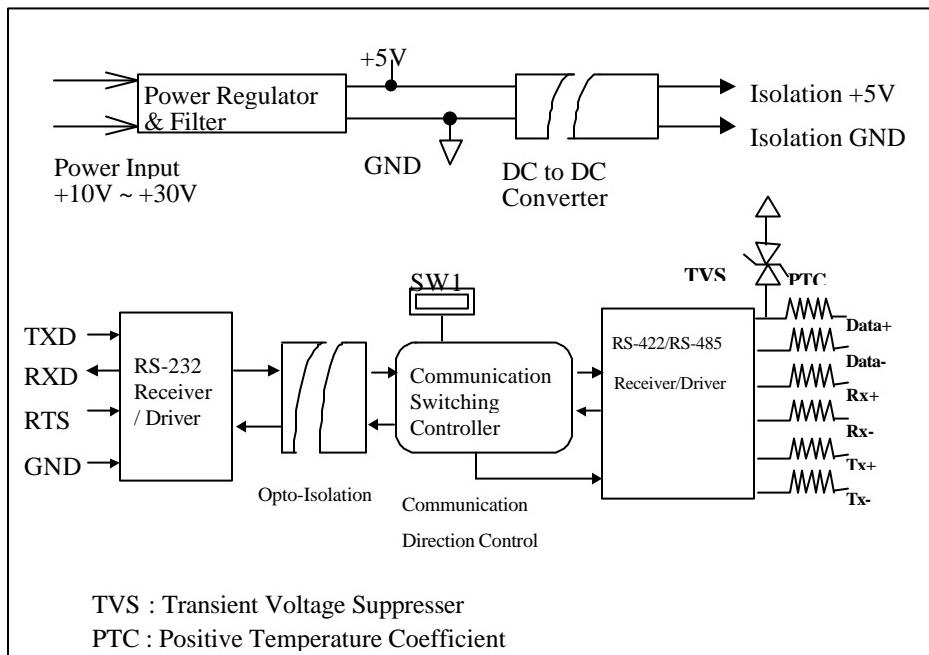
2.2 Setup

Objective of Setup

Normally, it is not necessary to setup the CYMOD 4520. The default configuration of this communication module is 9600 bps, and data format of 8 data bits with 1 start bit, 1 stop bit, and no parity check. Note that the data format is reserved to be compatible with other brand's communication port; it should not be modified if only CYMODs are used in a system. The baud rate can be configured according to the application's requirement.

Setup Equipment

A screw driver is necessary to open the case. Software, power supply, and wiring require no additional installation equipment.

Setup Procedure

Only the hardware switch setting can be setup in CM 4520. The user can set the speed of the serial interface (RS-232 and RS-422/RS-485), and the serial data format. The speed and the data format on the entire RS-485 network must be identical.

To setup the CM 4520, use the screw driver to open the case, then change the switch setting. The new setting is available after power up. The cover must be re-installed and locked carefully. Do not scratch the surface of the circuit while setting it up, otherwise the surface coating or the circuits themselves can be damaged.

(Note: For Harware Rev.C1 or later, there is switchless baud rate adjustment; the baud rate, parity and data bits adjust automatically.)

Default Setting

- ♦ 9600 baud rate
- ♦ 10 bits series data format : one start bit, eight data bits, one stop bit, no parity check

SW1 Setting

SW1 Default Setting (9600 bps)
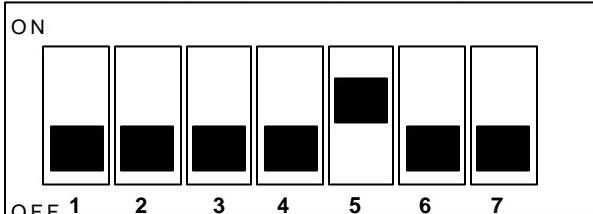
1	2	3	4	5	6	7	Baud Rate
ON	OFF	OFF	OFF	OFF	OFF	OFF	RTS Control
OFF	ON	OFF	OFF	OFF	OFF	OFF	1200 or 115.2k[1] bps
OFF	OFF	ON	OFF	OFF	OFF	OFF	2400 bps
OFF	OFF	OFF	ON	OFF	OFF	OFF	4800 bps
OFF	OFF	OFF	OFF	ON	OFF	OFF	9600 bps
OFF	OFF	OFF	OFF	OFF	ON	OFF	19200 bps
OFF	OFF	OFF	OFF	OFF	OFF	ON	38400 bps

Note 1: 115.2kbps is supported by version A1.2 or later.

SW2 Setting

SW2 Default Setting
Start Bits : 1
Data Bits : 8
Stop Bits : 1
Parity : None

1	2	Start Bit	Data Bits	Stop Bit	Parity	Packet Data Bits
OFF	OFF	1	7	1	0	9
		1	6	1	1	
OFF	ON	1	8	1	0	10
		1	7	1	1	
ON	OFF	1	9	1	0	11
		1	8	1	1	
ON	ON	1	10	1	0	12
		1	9	1	1	

2.3. Installation

Software Utility

Software is not necessary for this module.

Equipments for Installation

A host computer with RS-232 port

RS-232 cable (DB-9 female)

DC Power supply (+10V~+30V) (NDP-243u is recommended)

Wires (shielded and grounded are recommended)

Installation Procedure

1. Make sure the host computer is power off.
2. Use RS-232 cable to connect CYMOD 4520 with host computer.
3. Wire the power supply to CYMOD. Note that the power supply should meet specifications.
4. Wire the other CYMOD.

Application Wiring

The Figure 2-1 shows the application wiring of CYMOD 4520.
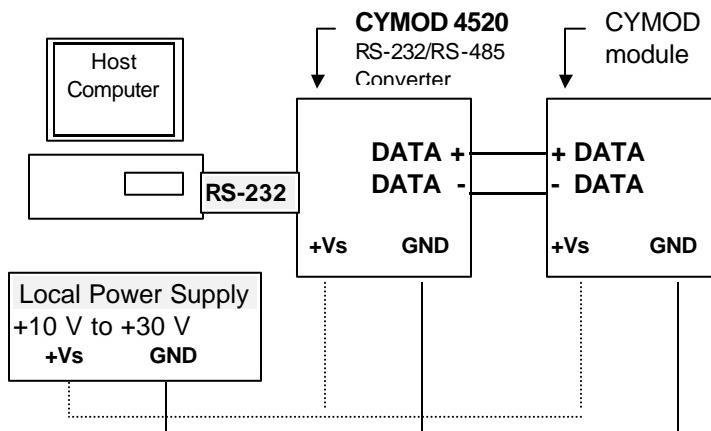
Figure 2-1 Application wiring of CYMOD 4520

2.4 Programming

The CYMOD 4520 is a communication module, it does not have to be programmed.

CYMOD 4510

3.1. Overview

What is the CYMOD 4510?

The CM 4510 is the RS-422/RS-485 signal repeater used to extend or to lengthen the network distance. A CYMOD bus can connect up to 128 modules. The repeater should be used when module numbers exceed 128. In addition, the repeater should also be used when the length of a signal bus is more than 4000 feet.

Features of CYMOD 4510

- RS-422/RS-485 signal transceiver & repeater

- Bi-directions signal transmission for both RS-422/RS-485 ports

- Automatic transmission direction control

- Easy setup and installation

- Maximum 128 CYMOD on a bus

- Maximum 256 addressable CYMOD modules

- High transfer speed

- Surge protection

- Lower power consumption

Specifications of CYMOD 4510

◆ **Input / Output**

- Interface : RS-485, differential 2 half-duplex wires RS-422, differential, 4 full-duplex wires
- Speed (bps) : 1200(115.2K[1], 2400, 4800, 9600, 19.2K, 38.4K
- Data Format : 9 bits, 10 bits, 11 bits, or 12 bits
- Max RS-485 network bus distance : 4000 ft. (1200m)

Note 1: 115.2k is supported by version A1.2 or later.

◆ **Bus**

- Max Loading : 128 CYMODs on a bus

◆ **Power**

- DC Power Supply : +10V to +30V
- Power Consumption : 0.9 W

CYMOD 4510 & Pin Assignment
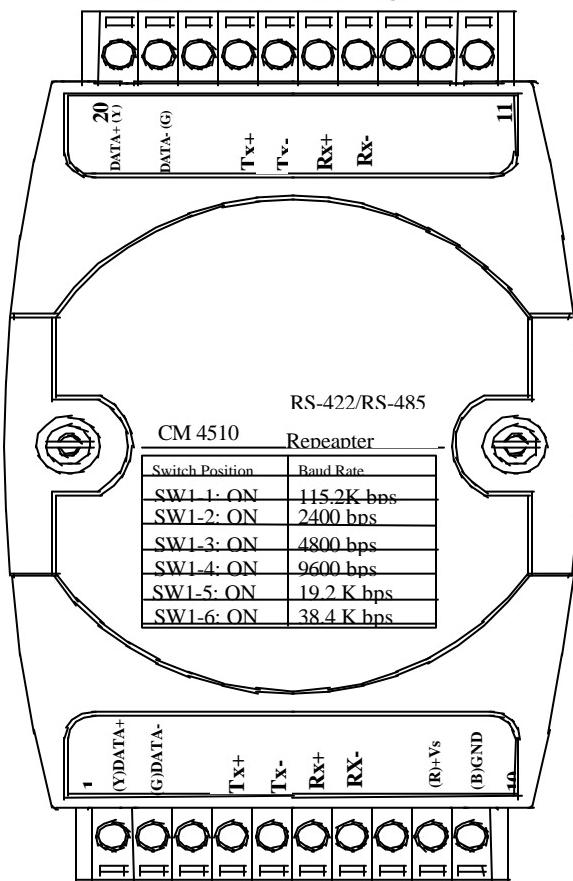
20 DATA+ (Y) DATA- (G) Tx+ Tx- Rx+ Rx- **11**

RS-422/RS-485

CM 4510   Repeapter

Switch Position	Baud Rate
SW1-1: ON	115.2K bps
SW1-2: ON	2400 bps
SW1-3: ON	4800 bps
SW1-4: ON	9600 bps
SW1-5: ON	19.2 K bps
SW1-6: ON	38.4 K bps

1 (Y)DATA+ (G)DATA- Tx+ Tx- Rx+ RX- (R)+Vs (B)GND **10**

Pin Definitions

Pin #	Signal Name	Description
1	(Y)DATA+	RS-485 transmission line, positive
2	(G)DATA-	RS-485 transmission line, negative
4	TXIN+	RS-422 transmission input line, positive
5	TXIN-	RS-422 transmission input line, negative
6	RXOUT+	RS-422 receiving output line, positive
7	RXOUT-	RS-422 receiving output line, negative
9	(R)+VS	CYMOD power supply, +10V~+30V
10	(B)GND	CYMOD ground
14	RXIN-	RS-422 receiving input line, negative
15	RXIN+	RS-422 receiving input line, positive
16	TXOUT-	RS-422 transmission output line, negative
17	TXOUT+	RS-422 transmission output line, positive
19	(G)DATA-	RS-485 transmission line, negative
20	(Y)DATA+	RS-485 transmission line, positive

CM 4510 Functional Block Diagram

TVS : Transient Voltage Suppresser
PTC : Positive Temperature Coefficient
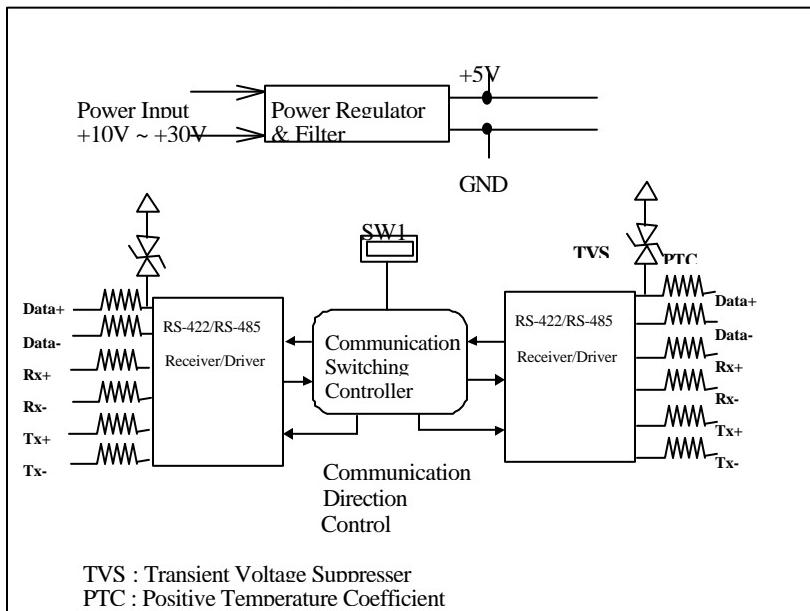
3.2. Setup

Objective of Setup

Normally, the CYMOD 4510 only needs to be set up when the CYMOD
bus exceeds 128 modules, or the bus distance exceeds 4000 feet. The
default configuration of this communication module is 9600 bps and data
format of 8 data bits with 1 start bit, 1 stop bit, and no parity check. Note that the
data format is reserved to be compatible with other brand's communication
ports, it should not be modified if only the CYMOD brand is used in a system.
The baud rate can be configured according user' s requirement.

Setup Equipment

Only screw driver is used to open the case. Software, power supply, and wiring
do not require additional installation equipment.

Setup Procedure

Only the hardware switch setting can be setup in CM 4510. The user can set the
speed and the data format of the RS-422/RS-485 interface. The speed and the
data format on the entire network must be identical.

To set up the CM 4510, use the screw driver to open the case, then change the
switch setting. The new setting is available after power up. The case must be
re-installed and locked carefully. Do not scratch the surface of the circuit while
setting it up; the surface coating or even the circuits may be damaged as a
result.

(Note: For Harware Rev.C1 or later, there is switchless baud rate
adjustment; the baud rate, parity, and data bits adjust automatically.)

Default Setting
- ♦ 9600 Baud rate
- ♦ 10 bits serial data format : one start bit, eight data bits, one stop bit,
     no parity check

SW1 Setting

SW1 Default Setting (9600 bps)
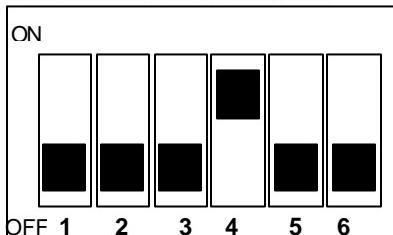
1	2	3	4	5	6	Baud Rate
ON	OFF	OFF	OFF	OFF	OFF	1200 or 115.2k[1] bps
OFF	**ON**	OFF	OFF	OFF	OFF	2400 bps
OFF	OFF	**ON**	OFF	OFF	OFF	4800 bps
OFF	OFF	OFF	**ON**	OFF	OFF	9600 bps
OFF	OFF	OFF	OFF	**ON**	OFF	19200 bps
OFF	OFF	OFF	OFF	OFF	**ON**	38400 bps

Note 1: 115.2kbps is supported by version A1.2 or later.

SW2 Setting

SW2 Default Setting
Start Bits : 1
Data Bits : 8
Stop Bits : 1
Parity : None

1	2	Start Bit	Data Bits	Stop Bit	Parity	Packet Data Bits
OFF	OFF	1	7	1	0	9
		1	6	1	1	
OFF	ON	1	8	1	0	10
		1	7	1	1	
ON	OFF	1	9	1	0	11
		1	8	1	1	
ON	ON	1	10	1	0	12
		1	9	1	1	

3.3   Installation

Software Utility

Software is not necessary.

Equipments for Installation

A 2-wire RS-485 network or 4-wire RS-422 network.

DC Power supply (+10V~+30V)

Wires

Installation Procedure

1. Make sure the original RS-422/RS-485 network is powered off.

2. Wire the power supply to CYMOD 4510. Note that the power supply should meet the specifications.

3. Wire other CYMODs to the extended RS-485 bus.

Application Wiring

CYMOD
module

**CYMOD 4510
Repeater**

CYMOD
module

DATA +	**+DATA**	**DATA+**	**+ DATA**
DATA -	**-DATA**	**DATA-**	**- DATA**
+Vs	**GND**	**+Vs**	**GND**	**+Vs**	**GND**

Local Power Supply
+10 V to +30 V
+Vs   GND
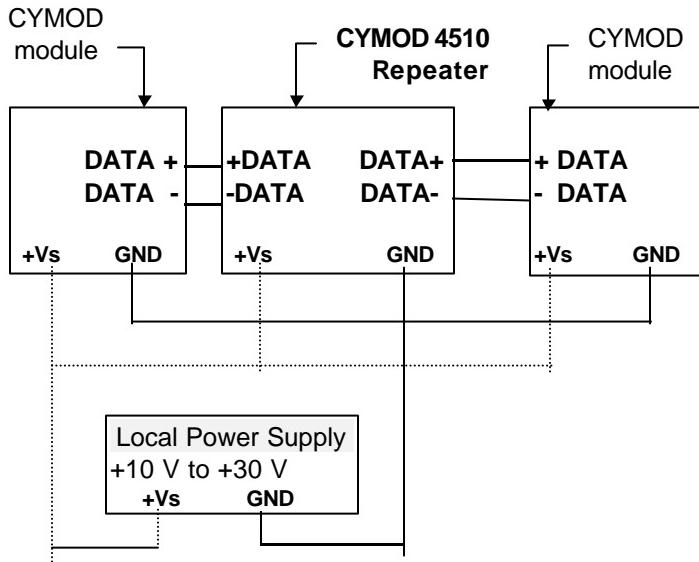
Figure 3-1 CYMOD 4510 wiring.

3.4   Programming

The CYMOD 4510 is a communication module, it does not have to
be programmed.

<div style="border: 2px solid black; display: inline-block; padding: 20px 40px;">

4

</div>

CYMOD 4530

4.1. Overview

What is CYMOD 4530 ?

Universal Serial Bus (USB) is an open, royalty free, Plug and Play standard for PC peripheral connectivity, supported by leading computer, telecommunications and software companies. It behaves in a similar fashion to conventional bus technology (serial, parallel, ISA…), but it is faster, and requires no additional slots or IRQs.

The CM 4530 takes advantages of the USB technology, and for the convenience of PC, IPC, notebooks, laptops and handheld OC users, it provides an easy way to link up with industry standard buses, interfacing with RS-232/422/485 standards.

Features of CYMOD 4530

- USB Specification 1.1 Compliant

- Plug and Play Installation

- Requires no AC outlet

- RS-232 support RTS CTS handshake signal

- Full-Duplex RS-422 support

- Half-Duplex RS-485 support

- Up to 128 RS-485 devices on the bus

- Auto direction flow control on RS-485

- High transfer Speed up to 115.2Kbps

- High isolation voltage up to 2500Vrms

- Surge protection on RS-232/422/485 lines

- Driver support for Windows 2000/98

- Low power consumption

- Easy setup and installation

Specifications of CYMOD 4530

◆ **USB controller:**
   ♦ USB Spec. 1.1 compliant

◆ **Transceiver:**
   ♦ RS-232: SP385E
   ♦ RS-422: LT490
   ♦ RS-485: LT1487

◆ **I/O Interface:**
   ♦ RS-232/422/485 DIP switch selectable
   ♦ RS-232 support RXD, TXD, RTS, CTS, FGND signals
   ♦ RS-422 support TX+, TX-, RX+, RX- 4 wires full-duplex signals
   ♦ RS-485 support DATA+, DATA- signals with auto direction control
   ♦ Selectable transfer speed with 1200, 2400, 4800, 9600, 19200, 38400, 115200 bps
   ♦ 2500Vrms isolation
   ♦ Surge protection on all signal lines

◆ **Connector:**
   ♦ USB type B
   ♦ 10 pin screw terminal block

◆ **LED Indicator:**
   ♦ ON: Receiving USB power

- ♦ Flashing: Data transfer
- ♦ OFF: No power applied

- ◆ **Cable: Type A to type B**

- ◆ **Storage Temperature Range: -25 to 80 ° C**

- ◆ **Operating Temperature Range: -10 to 70 ° C**

- ◆ **Power Requirement: USB bus power**

- ◆ **Power Consumption: 0.6W**

- ◆ **Case: ABS with captive mounting hardware**

- ◆ **CE Class A Conformity**

A Look at CYMOD 4510 & Pin Assignment

CM 4530

USB to RS-232/422/485
Converter

TX+/D+ TX-/D- RX+ RX- TX RX RTS CTS FGND
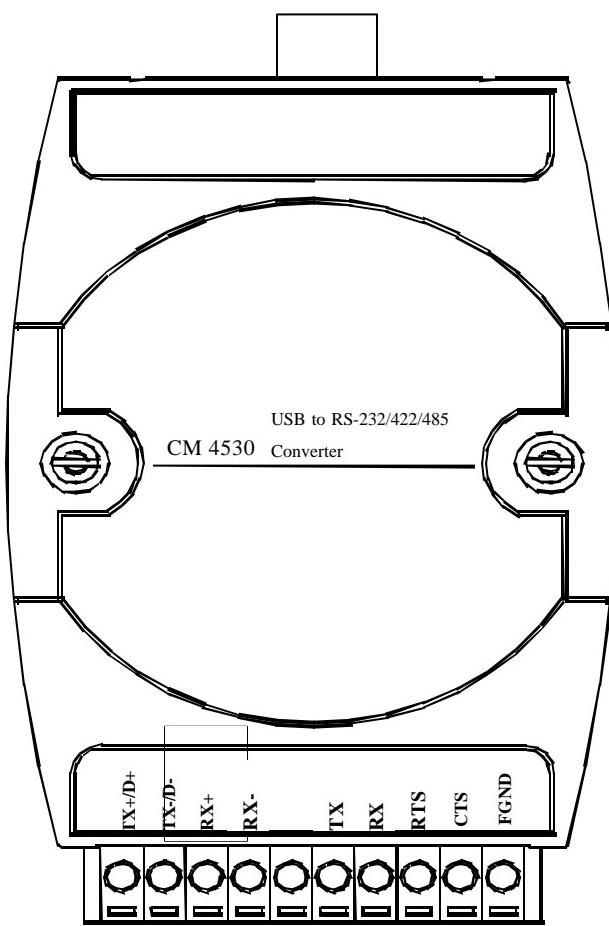
Pin Definitions

Pin #	Signal Name	Description
1	TX+/D+	RS-422 or RS-485 transmission line, positive
2	TX-/D-	RS-422 or RS-485 transmission line, negative
3	RX+	RS-422 receive line, positive
4	RX-	RS-422 receive line, negative
5	NC	No connection
6	TX	RS-232 transmission line
7	RX	RS-232 receive line
8	RTS	Request to send
9	CTS	Clear to send
10	F.GND	Ground
	USB	Type B connector
1	+5V	USB +5V bus power
2	Data-	USB data line, negative
3	Data+	USB data line, positive
4	Ground	USB bus power ground

CM 4530 Functional Block Diagram
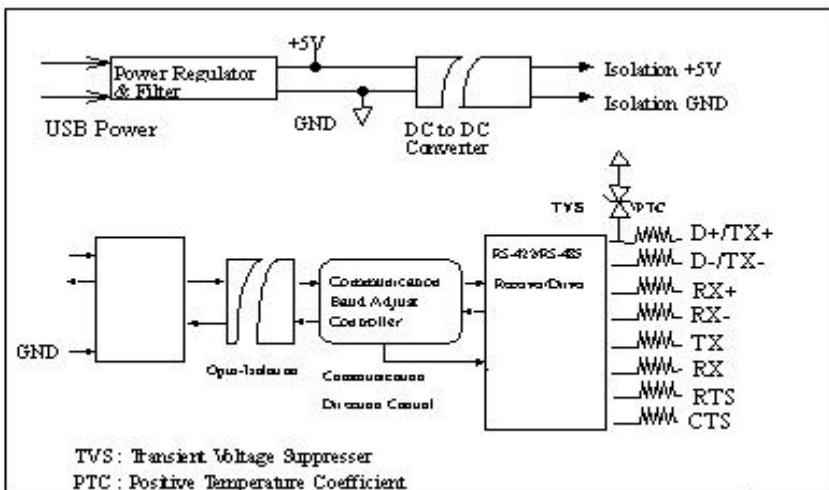
TVS : Transient Voltage Suppresser
PTC : Positive Temperature Coefficient

4.2 Setup

Objective of Setup

Normally, it is not necessary to set up the CYMOD 4520. The default configuration of this communication module is in RS-485 mode, supporting a baud rate of 75 to 115200, with data format including 5, 6, 7, 8 or 16 bits. Its stop bit support 1, 1.5 or 2 bits, parity types are None, Odd, Even, Mark and Space. Note that the data format is reserved to be compatible with other brand's communication ports, it should not be modified if only CYMOD brand is used in a system.   There is no need to configure the baud rate.

Setup Equipment

A screw driver is needed to adjust the dip switch (next to the USB connector) for protocol type selection.

Setup Procedure

Only the hardware switch setting can be set up in CM 4530. The user can select the protocol types from the RS-422, RS-485 or RS-232 interface. The speed and data format on the entire network must be identical.

To set up the CM 4530, use the screw driver to adjust the dip switch beside the USB connector to select the protocol type. The new setting is available at power up.

Default Setting

- **RS-485 Interface**

DIP Switch Setting

RS-485 (Default)
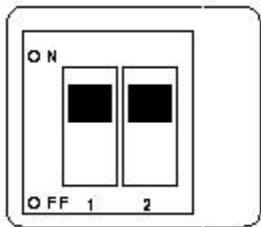
RS-422
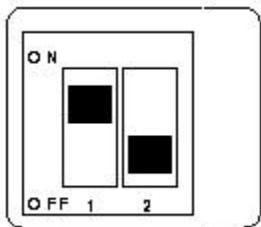
RS-232
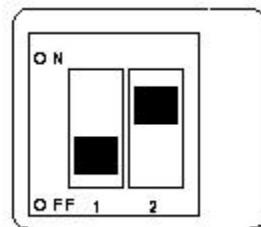
4.3   Installation

Software Utility

Install the CM 4530 Driver from the installation CD.

Equipments for Installation

A computer with USB port

Window 98 or Win2000 operation system

USB host controller installed on the system

USB cable (type A to type B)

◆   **Windows 98 Installation:**

1. Plug the CM 4530 into the computer USB port or a USB hub. The **New Hardware Wizard** appears, click on **Next** to continue.

2. In the dialog box that comes up, leave the default choice (Search for the best drivers for your device), click on **Next** to continue.

3. In the dialog box that comes up, select the CD-ROM check box, and click on **Next** to continue.

4. In the dialog box that appears click **Next** to continue.

5. When the dialog box appears with the Cyber USB driver displayed as the preferred device driver, click Next.

6. When the PC copies the flies over to its hard drive successfully, click Finish.

Installation Complete:

Now you have installed CM 4530 on your system. You will see a new USB serial device in **Control → Device Manager.** The CM 4530 plays a role as standard COM port, you can use any UART serial communication utility (eg. HyperTerminal), or call standard windows API for COM.

◆ **Windows 2000 Installation**

1. Plug the CM 4530 into the computer USB port or a USB hub

2. Then there will be a dialog box as following

3. Please click the next step, and it will show as
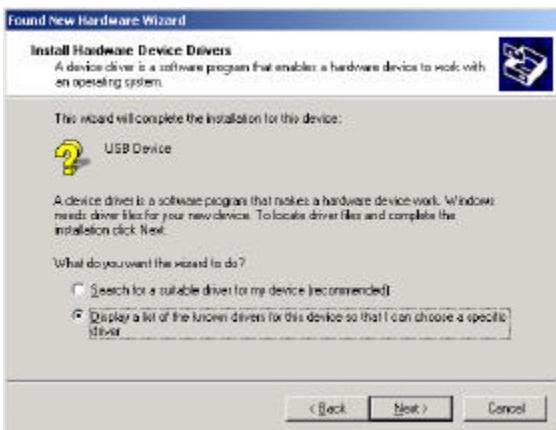
Please select the item " Display a list of the known drivers so that I can choose a specific driver" and click **Next**.

4. When the Hardware Type dialog box appears, choose the item "**Com & LPT."** Then click **Next**
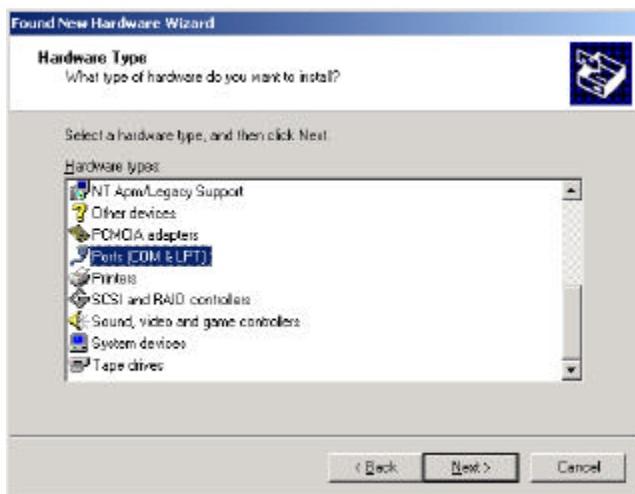
And please choose the device as following
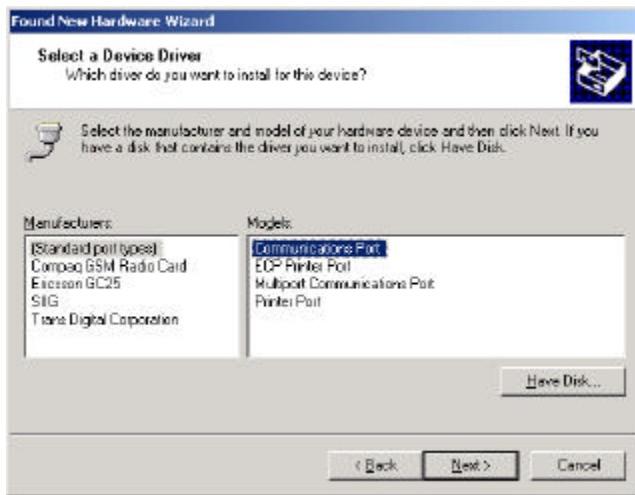
5. Choose the driver called Cyber USB-to-Serial Com Port.

6. A dialog box will then appear with instruction that the selected device driver is ready to be installed. Click the Next button.

7. You can now install the CM 4530 on your host.

7. To check if the installation is success, please check the device in your device manager, and there should be a device as

Application Wiring

RS-485

For RS-485 Transmission Distance Up to 1,200m (4,000 ft.) Load more than 128 CYMOD I/O modules or more than 32 others RS-485 devices

DATA+

DATA-

RS-485 Device

DATA+   DATA+

DATA-   DATA-

DATA+   DATA+

DATA-   DATA-

RS-422

For RS-422 Transmission Distance Up to 1,200m (4,000 ft.)

RS-232

RS-232 Device
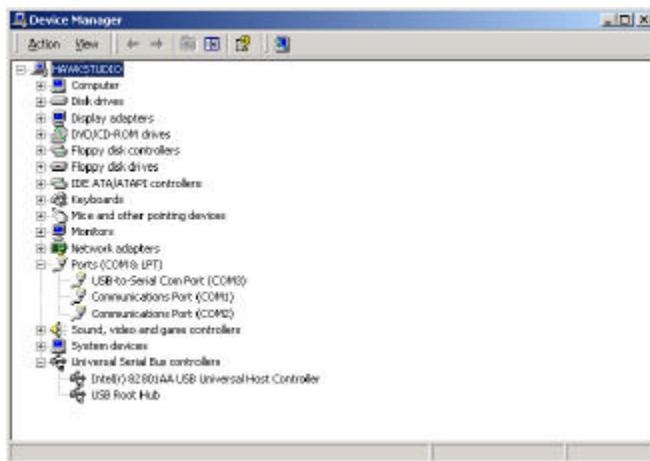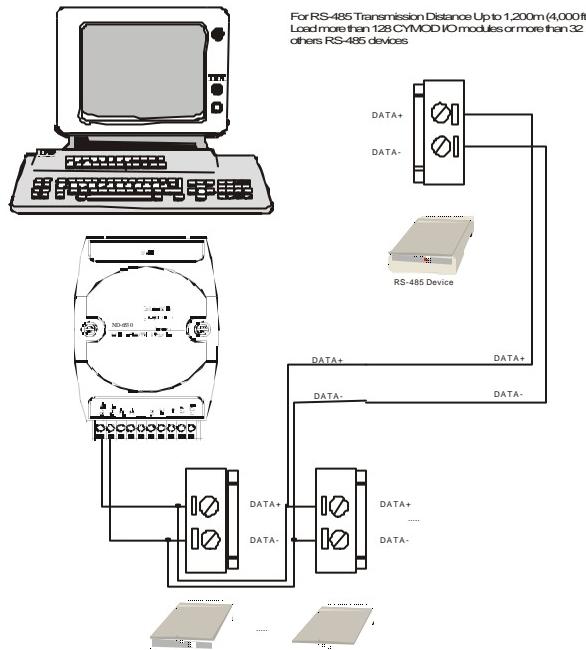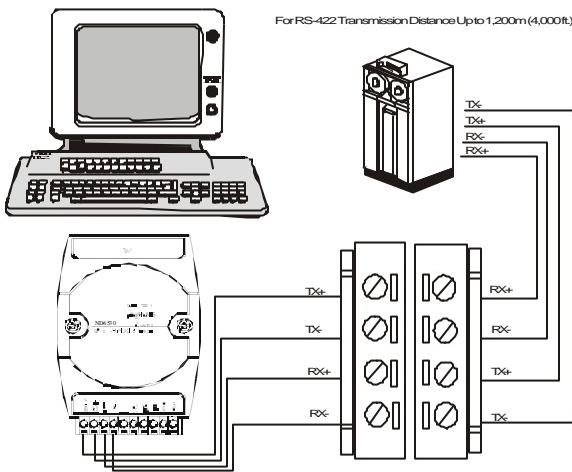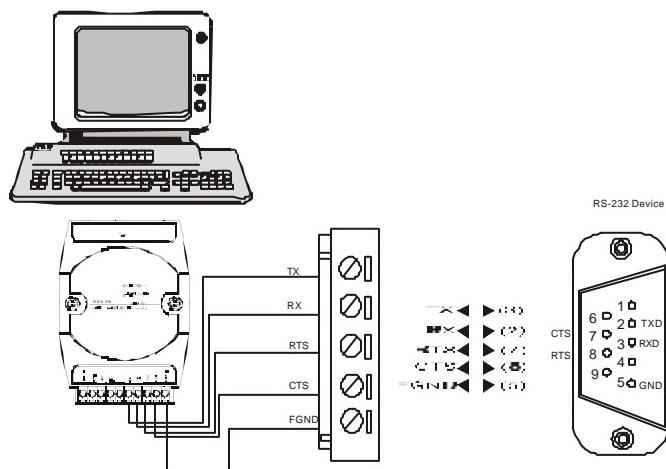
4.4   Programming

The CYMOD 4530 is a communication module, it does not have to be programmed.

5

CYMOD 4531

5.1. Overview

What is CYMOD 4531?

CYMOD 4531 is an RS-422/485 to RS-232 converter. It converts the RS-422/485 communication signal to the RS-232 signals which allows RS-232 devices to link up to RS-422/485 multi-drop networks.

Features of CYMOD 4531

- RS-422/RS-485 transceiver
- RS-232 support RTS CTS handshake signal
- RS-232 and RS-422/485 can be different baud rate
- Full-Duplex RS-422 support
- Half-Duplex RS-485 support
- Up to 128 RS-485 devices on the bus
- Auto direction flow control on RS-485
- Addressable and non-addressable mode configurable
- High transfer Speed up to 115.2Kbps
- High isolation voltage up to 2500Vrms
- Surge protection on RS-422/485 lines
- Low power consumption
- Easy setup and installation

Specifications of CYMOD 4531

◆ **Transmission Speed (bps): 1,200 ~ 115,200 (RS-422/485 and RS-232 can set to different baud rate)**

◆ **Data Format: (RS-232) (RS-422/485 is fixed to 1 stop bit, non-parity, 8 data bits format)**
   - ♦ Stop bits: 1, 2
   - ♦ Parity type: None, Even, Odd
   - ♦ Data bits: 5, 6, 7, 8

◆ **RS-232:**
   - ♦ 9 pin D-sub female connector
   - ♦ Support RXD, TXD, RTS, CTS signals

◆ **RS-422:**
   - ♦ Differential 4 full duplex wires
   - ♦ Support TX+, TX-, RX+, RX- signals
   - ♦ Surge protection on signal pins

◆ **RS-485:**
   - ♦ Differential 2 half duplex wires
   - ♦ Support DATA+, DATA- signals
   - ♦ Surge protection on signal pins

◆ **Isolation Voltage: 1000 V$_{DC}$**

◆ **Storage Temperature Range: -25 to 80 ° C**

◆ **Operating Temperature Range: -10 to 70 ° C**

◆ **Power Requirement: +10V to +30V$_{DC}$ Unregulated with against power reversal**
   - ♦ Power Consumption: 0.75W

◆ **Case: ABS with captive mounting hardware**

◆ **CE Class A Conformity**

A Look at CYMOD 4531 & Pin Assignment
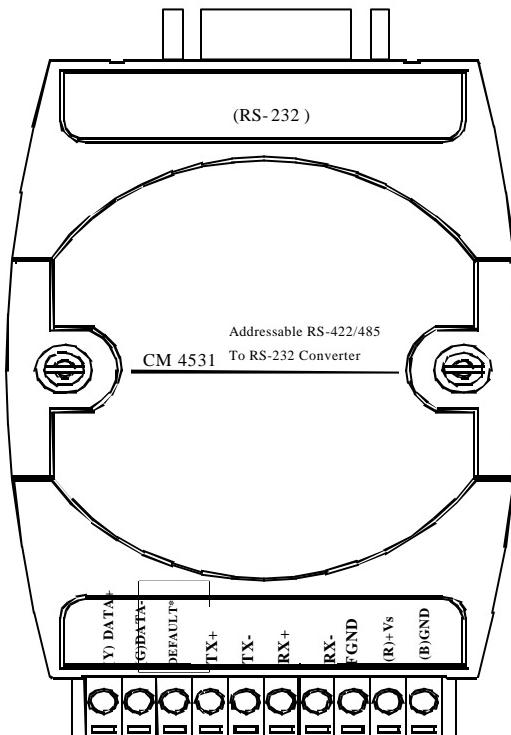
Pin Definitions

Pin #	Signal Name	Description
1	(Y)DATA+	RS-485 transmission line, positive
2	(G)DATA-	RS-485 transmission line, negative
3	DEFAULT*	Initial state setting
4	TX+	RS-422 transmission line, positive
5	TX-	RS-422 transmission line, negative
6	RX+	RS-422 receiving line, positive
7	RX-	RS-422 receiving line, negative
8	FGND	Field ground
9	(R)+VS	Power supply, +10V~+30V
10	(B)GND	Ground
	RS-232	9-pin RS-232 connector

The module is in DEFAULT mode when DEFAULT pin connected to GND while applying power on the module.

Do not apply any power signal to DEFAULT pin, just left it open or connected it to GND.

Functional Block Diagram

TVS : Transient Voltage Suppresser

PTC : Positive Temperature Coefficient
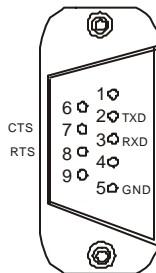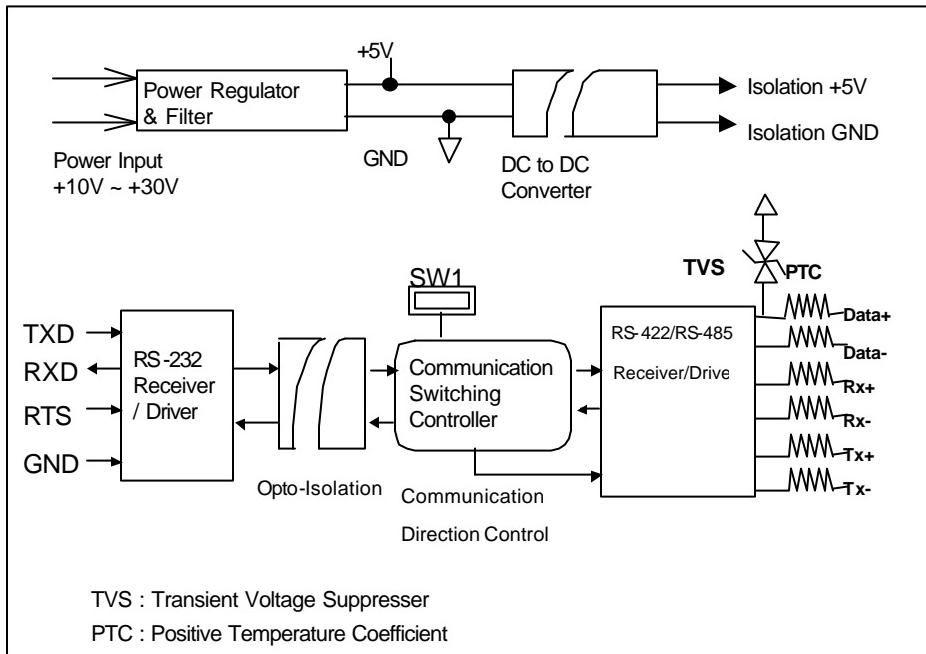
5.2 Initial**iz**ation & Installation

Software Installation

1. If CYMOD Administration is installed, skip the subsequent steps.

2. Backup your software diskette.

3. Insert the Administration disc into CD-ROM.

4. Change the drive path of CD-ROM to reflect your CD-ROMs assigned drive letter.

5. Find the setup of CYMOD Administration and run it.

6. Please follow the steps of setup program to succesfully install the Administration software.

Objective of Initializing a Brand-New CYMOD 4531

All CYMOD modules except CYMOD 4520, 4510, and 4530, in a RS-485 network must have an *unique* address ID, however, every brand-new CYMOD 4531 has a factory default setting as following:

- ♦ Address ID is 01.
- ♦ Baud rate is 9600 bps
- ♦ RS-485 Interface
- ♦ Host Watchdog timer is disable

Therefore, you must configure a new CYMOD unit before use, otherwise the default address ID will conflict with other modules. The b aud rate may also be changed according to user's requirements.

Default State

The CYMOD I/O modules must be set at *Default State* when you want to change the default settings, such as the ID address, baud rate, check-sum status etc. All CYMOD I/O modules have a special pin labeled as **DEFAULT***. The module will be in *Default State* if the **DEFAULT*** pin is shorted to ground when the power is ON. In this state, the default configuration is set as following:

- ♦ Address ID is 00.
- ♦ Baud rate is 9600 bps.
- ♦ RS-485 Interface

Therefore, the communication between host and the module can easily be set with the same configuration, making the initialization of a module possible no matter what configuration is set.

Initialization Equipments

- ♦ Host computer with an RS-232 port.
- ♦ An installed RS-485 module (CYMOD 4520 or 4530) with 9600 baud rate.
- ♦ The brand new CYMOD 4531
- ♦ Power supply (+10 to +30 V_{DC}) for CYMOD modules
- ♦ Administration utility software

Note1: Never Connect the DRFAULT* pin to Vs or power source.

Initialization Procedure

1. Power off the host computer and the installed CYMOD 4520 or 4530. Be sure the baud rate of the CYMOD 4520 or 4530 is 9600 bps.

2. Connect a brand new CYMOD module with the RS-485. Set the module in *Default State* by shorting the **DEFAULT*** pin. Refer to Figure 5.1 for detailed wiring.

3. Power on the host computer.

4. Power on the power supply for CYMOD modules.

5. Use the CYMOD Administrating utility to configure the address ID, Baud rate and check-sum status of the module.

Initialization Wiring
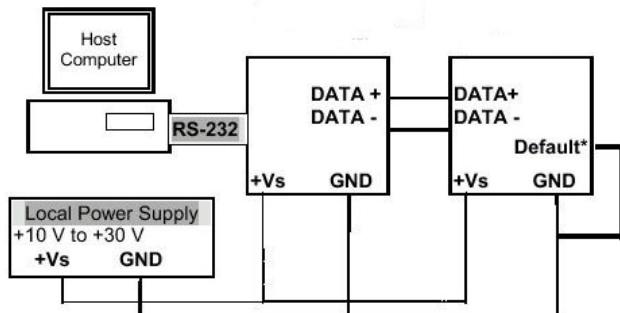
Figure 5-1 Layout for Initialization

5.3. Install a New **CYMOD 4531** to a Existing Network

Equipments for Install a New Module

- ♦ A existing CYMOD network
- ♦ New CYMOD modules.
- ♦ Power supply (+10 to +30 V_{DC}).

Installation Procedure

1. Configure the new CYMOD module according to the initialization procedure in section 2.2.
2. The baud rate and check-sum status of the new module must match with the existing RS-485 network. The address ID must not conflict with other CYMOD modules on the network.
3. Power off the CYMOD power supply of the existing RS-485 network.
4. Power off the host computer.
5. Wire the power lines for the new CYMOD with the existing network. Be careful about the signal polarity.
6. Wire the RS-485 data lines for the new CYMOD with the existing network. Be careful about the signal polarity.
7. Wire to the input or output devices. Refer to section 2.4 for illustrations.
8. Power on the host computer.
9. Power on the CYMOD local power supply.
10. Use the administration utility to check entire network.

Application Wiring

Host with RS-422/485 I/F

CM 4524

RS-232 Device
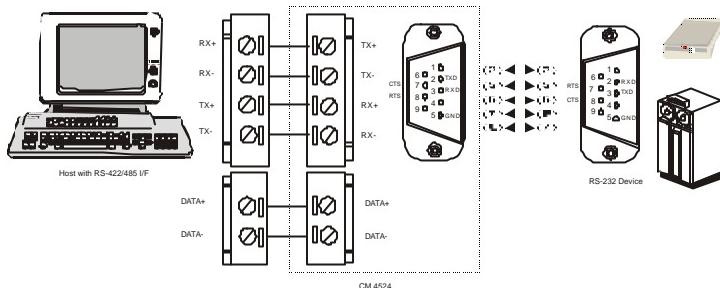
5.4   Command Set

5.4.1 Command and Response

Introduction

The CYMOD command is composed by numbers of characteristics, including the leading code, address ID, the variables and a carriage return to indicate the end of a command. The host computer can command only one CYMOD module. The slave device may or may not give response to the command.

(Leading Code)	Leading Code is the first character of the CYMOD command. All CYMOD commands need a command leading code, such as %,$,#,@,...etc. 1- character
(Addr)	Module' s address ID, the value is in the range of 00 - FF (Hexadecimal) if no specified in the following. 2- character
(Command Variable)	Items indicate command codes or value of variables. Variable length
[Data]	Some output commands need data. Variable length
[Checksum]	Checksum in brackets indicates an optional parameter. This field is required only if checksum is enabled. 2- character
< >	Identifies a control code character, such as <CR> for carriage return, its value is 0x0D. **1- character**

Format of CYMOD Commands

(Leading Code)(Addr)(Command)[Data]<CR>

Example:

User Command:	$012<CR>
Response:	!01400600<CR>

$:	LeadingCode
01:	Address
2:	Command (Read Configuration)
<CR>:	Carriage return 0x0D

Response of CYMOD Commands

The response message depends on CYMOD command. The response is also composed with several characteristics, including leading code, variables, and carriage return for ending. There are two kinds of leading code for response message: "!" or ">" means valid command, and "?" means invalid. By checking the response messages, a user can monitor device status.

Note : Under the following conditions, there will be no response message.
   1. The specified address ID does not exist.
   2. Syntax error.
   3. Communication error.
   4. Some special commands do not have response.

5.4.2 Summary of Command Set

Command Set of Digital I/O Modules	
Command	**Syntax**
General Commands	
Set Configuration	**%(OldAddr)(NewAddr) (TypeCode)(BaudRate) (CheckSumFlag)**
Read Configuration	**$(Addr)2**
Read Module Name	**$(Addr)M**
Read Firmware Version	**$(Addr)F**
Soft Reset	**$(Addr)RS**
Reset Status	**$(Addr)5**
Functional Commands	
Set RTS Status	**$(Addr)0(RTS Status)**
Read RTS Status	**$(Addr)3**
Read CTS Status	**$(Addr)1**
Set Device ID	**$(Addr)6(Device ID)**
Read Device ID	**$(Addr)7**
Set Delimiter	**$(Addr)C(Delimiter)**
Read Delimiter	**$(Addr)D**
Data Pass	**(Delimiter)(Addr)(Data)**
Open/Close Data Gate	**&(Addr)8(Data Gate Mode)**

Special Commands	
Read Command Leading Code Setting	**~(Addr)0**
Change Command Leading Code Setting	**~(Addr)10(C1)(C2)(C3) (C4)(C5)(C6)**
Set Host Watchdog / Safety Value	**~(Addr)2(Flag)(TimeOut) (SafeValue)**
Read Host WatchDog / Safe Value	**~(Addr)3**
Host is OK	**~****

5.4.3 Set Configuration

@Description

Configure the basic setting about address ID, baud rate, and checksum.

@Syntax

%(OldAddr)(NewAddr)(TypeCode)(BaudRate)(DataFlag)<CR>

%		Command leading code. (1-character)
(OldAddr)		Original address ID. The default address ID of a brand new module is 01. The value range of address ID is 00 to FF in hexadecimal. **(2-character)**
(NewAddr)		New address ID, if you don't want to change address ID, let new address ID equal the old one. **(2-character)**
(TypeCode)		Type Code is fixed *40H*. **(2-character)**
(BaudRate)		Communication baud rate, refer to Table 3-1 for details. The first character is for RS-232, the second character is for RS422/485. **(2-character)**
(DataFlag)		Define check-sum status, refer to Table3-2 for details. **(4-character, WXYZ)** WX is for module system setting. YZ is for RS-232 configuration.
W. bit 3	**0**	Normal addressable mode (*Default Setting)
	1	**Non-addressable mode (CM 4520 mode)**
W. bit 2	**0**	**Disable checksum (*Default Setting)**
	1	**Enable checksum**
W. bit 1	**0**	**RS-422 interface**

	1	RS-485 interface (*Default Setting)
W. bit 0		**Don't care, set to 0**
X. bit 3		**Don't care, set to 0**
X. bit 2		**Don't care, set to 0**
X. bit 1		**Don't care, set to 0**
X. bit 0	**0**	**Don't append <CR> in output string**
	1	**Append <CR> in output string(*Default Setting)**
Y. bit 3		**Don't care, set to 0**
Y. bit 2		**Don't care, set to 0**
Y. bit 1		**Don't care, set to 0**
Y. bit 0	**0**	**Odd parity (*Default Setting)**
	1	**Even parity**
Z. bit 3	**0**	**Non-parity mode (*DefaultSetting)**
	1	**Parity mode**
Z. bit 2	**0**	**One stop bit (*Default Setting)**
	1	**Two stop bit**
Z. bit 1 0	**00**	**5 data bit format**
	01	**6 data bit format**
	10	**7 data bit format**
	11	**8 data bit format**

@Response

!(Addr)<CR>

or

?(Addr)<CR>

(Addr)	Address ID.
!	Command is valid.
?	Command is invalid. Invalid parameter values, When you wanted to change the setting without grounding the DEFAULT* pin.

Note :When you want to change the checksum or baud rate or DataFlag, the DEFAULT* pin should be grounded first.

@Example

User command:	%013040662103<CR>
Response:	!30<CR>

Item	Meaning	Description
%	(Leading Code)	Command leading code.
01	(OldAddr)	Original address ID is 01H.
30	(NewAddr)	New address ID is 30H (Hexadecimal).
40	(TypeCode)	6521 module.
6	(BaudRate for RS-422/485)	Baud rate is 9600 for RS-422/485.
6	(BaudRate for RS-232)	Baud rate is 9600 for RS-232.
2103	(DataFlag)	Addressable mode Checksum is disable RS-485 interface Append <CR> Non-parity 8 data bit
<CR>	Carriage return	0x0D.

Code	Baudrate
3	1200 bps
4	2400 bps
5	4800 bps
6	9600 bps
7	19200 bps
8	38400 bps
9	115200 bps
A	57600 bps

Table 5-1. Baud rate setting code

5.4.4 Read Configuration

@Description

Read the configuration of module on a specified address ID.

@Syntax

$(Addr)2<CR>

$	Command leading code
(Addr)	Address ID.
2	Command code for reading configuration

@Response

!(Addr)(TypeCode)(BaudRate)(DataFlag)<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID.
(TypeCode)	It always be 40 (Hex)
(BaudRate)	Current setting of communication baud rate of RS-422/485 and RS-232, refer to Table 3-1 for details.
(DataFlag)	Current setting of module setting and RS-232 configuration. Refer 3.3 for details.

@Example

User command:	$302<CR>
Response:	!3040662103<CR>

!	Command is valid.
30	Address ID.
40	Digital I/O module.
66	Baud rate is 9600 for RS-422/485 and RS-232.
2103	Addressable mode
	Checksum is disable
	RS-485 interface
	Append <CR>
	Non-parity
	8 data bit

5.4.5 Read Module Name

@Description

Read module' s name.

@Syntax

$(Addr)M<CR>

$	Command leading code.
(Addr)	Address ID
M	Read module name

@Response

!(Addr)(ModuleName) <CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID.
(ModuleName)	CYMOD module's name.

@Example

User command:	$30M<CR>
Response:	!306521<CR>

!	Command is valid.
30	Address
6521	CM 4531 (RS-422/485 to RS-232 converter)

5.4.6 Read Firmware Version

@Description

Read CYMOD module' s firmware version.

@Syntax

$(Addr)F<CR>

$	Command leading code.
(Addr)	Address ID
F	Read module firmware version.

@Response

!(Addr)(FirmRev) <CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID.
(FirmRev)	CYMOD module' s firmware version.

@Example

User command:	$30F<CR>
Response:	!30E1.00<CR>

!	Command is valid.
30	Address
E1.00	Firmware Version

5.4.7 Soft Reset

@Description

Reset the module by software command

@Syntax

$(Addr)RS<CR>

$	Command leading code.
(Addr)	Address ID
RS	Soft Reset Command

@Response

!(Addr)<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID.

@Example

User command:	$30RS<CR>
Response:	!30<CR>

5.4.8 Reset Status

@Description

Checks the reset status of module at specified address to see whether it has been reset since the last reset status command was issued to the module.

@Syntax

$(Addr)5<CR>

$	Command leading code.
(Addr)	Address ID
5	Reset Status Command

@Response

!(Addr)(Status)<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID.
(Status)	0 : It has not been reset since the last reset status command was issued.
	1 : It has been reset since the last reset status command was issued

@Example

User command:	$305<CR>
Response:	!300<CR>

Status is 0 means this module has not been reset since the last reset status command was issued.

5.4.9 Set RTS Status

@Description

Set the RS-232 RTS signal to specified value.

@Syntax

$(Addr)0(RTS Status)<CR>

$	Command leading code. **(1-character)**
(Addr)	Address ID (2-character)
0	Set RTS Status command
(RTS Status)	0 : Set RTS Status to 0
	1: Set RTS Status to 1

@Response

!(Addr)<CR>

or

?(Addr)<CR>

!	Command is valid
?	Command is invalid.
(Addr)	Address ID.

@Example

User command:	$3001<CR>
Response:	!30<CR>

30	Address ID
0	Set RTS Status command
1	Set the RTS signal to 1

5.4.10 Read RTS Status

@Description

Read the RS-232 RTS status.

@Syntax

$(Addr)3<CR>

$	Command leading code. **(1-character)**
(Addr)	Address ID (2-character)
3	Read RTS status command

@Response

!(Addr)(RTS Status)<CR>

or

?(Addr)<CR>

!	Command is valid
?	Command is invalid.
(Addr)	Address ID.
(RTS Status)	0 : RTS Status is 0
	1: RTS Status is 1

@Example

User command:	$303<CR>
Response:	!301<CR>

5.4.11 Read CTS Status

@Description

Read the RS-232 CTS status.

@Syntax

$(Addr)1<CR>

$	Command leading code. **(1-character)**
(Addr)	Address ID (2-character)
1	Read CTS status command

@Response

!(Addr)(CTS Status)<CR>

or

?(Addr)<CR>

!	Command is valid
?	Command is invalid.
(Addr)	Address ID.
(CTS Status)	0 : CTS Status is 0
	1: CTS Status is 1

@Example

User command:	$301<CR>
Response:	!300<CR>

5.4.12 Set Device ID

@Description

Set the ID of RS-232 network.

@Syntax

$(Addr)6(Device ID)<CR>

$	Command leading code. **(1-character)**
(Addr)	Address ID (2-character)
6	Set Device ID command
Device ID	RS-232 Device ID for up to 24 bytes

@Response

!(Addr)<CR>

or

?(Addr)<CR>

!	Command is valid
?	Command is invalid.
(Addr)	Address ID.

@Example

User command:	$306CYMOD Network 1<CR>
Response:	!30<CR>

30	Address ID
6	Set Device ID command
CYMOD Network 1	Set the ID on address #30 to "CYMOD Network 1"

5.4.13 Read Device ID

@Description

Read the ID of RS-232 network.

@Syntax

$(Addr)7<CR>

$	Command leading code. **(1-character)**
(Addr)	Address ID (2-character)
7	Read Device ID command

@Response

!(Addr)(Device ID)<CR>

or

?(Addr)<CR>

!	Command is valid
?	Command is invalid.
(Addr)	Address ID.
Device ID	RS-232 Device ID

@Example

User command:	$307<CR>
Response:	!30CYMOD Network 1<CR>

30	Address ID
CYMOD Network 1	The ID on address #30 is "CYMOD Network 1"

5.4.14 Set Delimiter

@Description

Set the delimiter character for the Data Pass command.

@Syntax

$(Addr)C(Delimiter)<CR>

$	Command leading code. **(1-character)**
(Addr)	Address ID (2-character)
C	Set Delimiter command
Delimiter	8 special character:
	**: [ ] ^ { }	~**
	can be used for delimiter

@Response

!(Addr)<CR>

or

?(Addr)<CR>

!	Command is valid
?	Command is invalid.
(Addr)	Address ID.

@Example

User command:	$30C{<CR>
Response:	!30<CR>

30	Address ID
C	Set Delimiter command
{	Use { as Data Pass delimiter

5.4.15 Read Delimiter

@Description

Read the delimiter character.

@Syntax

$(Addr)D<CR>

$	Command leading code. **(1-character)**
(Addr)	Address ID (2-character)
D	Read delimiter command

@Response

!(Addr)(Delimiter)<CR>

or

?(Addr)<CR>

!	Command is valid
?	Command is invalid.
(Addr)	Address ID.
Delimiter	Delimiter character

@Example

User command:	$30D<CR>
Response:	!30{<CR>

30	Address ID
{	{ is used as delimiter for Data Pass command

5.4.16 Data Pass

@Description

Pass the data to RS-232 device.

@Syntax

(Delimiter)(Addr)(Data)<CR>

(Delimiter)	Data pass delimiter character
(Addr)	Address ID (2-character)
Data	Data to the RS-232 device, up to 80 bytes of data can be passed by one command

@Response

No response

@Example

User command:	{30ABCDEFGHIJ<CR>
Response:	

{	Use { as Data Pass delimiter
30	Address ID
ABCDEF	Data pass to RS-232 device (if X.0 = 0, don't append <CR>)
ABCDEF<CR>	Data pass to RS-232 device (if X.0 = 1, append <CR> mode)

5.4.17 Open/Close Data Gate

@Description

Set the CM 4530 as non-addressable mode or addressable mode.

@Syntax

&(Addr)8(Data Gate Mode)<CR>

&		Command leading code. **(1-character)**
(Addr)		Address ID (2-character)
8		Open/Close Data Gate Command
Data	Gate	10: Open the CM 4530 as non-addressable mode
Mode		00: Close the CM 4530 as addressable mode

@Response

!(Addr)<CR>

or

?(Addr)<CR>

@Example

User command:	&30810<CR>
Response:	!30

&	Command leading code
30	Address ID
10	Open data gate

* Once the gate is open, the CM 4530 can be used as the CM 4520 for transparent data converter.

5.4.18 Read Command Leading Code Setting

@Description

Read command leading code setting status.

@Syntax

~(Addr)0<CR>

~	Command leading code.
(Addr)	Address ID
0	Read command leading code setting.

@Response

!(Addr)(Status)(C1)(C2)(C3)(C4)(C5)(C6)<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID
(Status)	(2-character)
	Bit 0 : Reserved
	Bit 1 : Power failure or watchdog failure
	Bit 2 : Host watchdog is enable
	Bit 3 : Host failure
(C1)	Leading code 1, for read configuration status, firmware version, etc. default is **$.** (1-character)
(C2)	Leading code 2, for read synchronize sampling, digital output ,default is **#. (1-character)**
(C3)	Leading code 3, for change configuration. default is %. (1-character)
(C4)	Leading code 4, for read alarm status, enable alarm, etc. default is **@. (1-character)**
(C5)	Leading code 5, for read command leading code, change command leading code, etc. default is **~. (1-character)**
(C6)	Leading code 6, this leading code is reserved. Default is ***. (1-character)**

@Example

User command:	~300<CR>
Response:	!3000$#%@~*<CR>

Command leading code setting is $#%@~* for module address ID 30, current status is factory default setting.

5.4.19 Change Command Leading Code Setting

@Description

User can use this command to change command leading code setting as desired.

@Syntax

~(Addr)10(C1)(C2)(C3)(C4)(C5)(C6)<CR>

~	Command leading code.
(Addr)	Address ID, range (00 - FF).
10	Change command leading code setting.
(C1)	Leading code 1, for read configuration status, firmware version, etc. default is **$. (1-character)**
(C2)	Leading code 2, for read synchronize sampling, digital output ,default is **#. (1-character)**
(C3)	Leading code 3, for change configuration. default is %. (1-character)
(C4)	Leading code 4, for read alarm status, enable alarm, etc. default is **@. (1-character)**
(C5)	Leading code 5, for read command leading code, change leading code, etc. default is **~.** (1-character)
(C6)	Leading code 6, this leading code is reserved. default is ***. (1-character)**

@Response

!(Addr)< CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID.

@Examples

User command:	~300<CR>
Response:	!3000**$**#%@~*<CR>
User command:	~3010**A**#%@~*<CR>
Response:	!30<CR>
User command:	**A**30F
Response:	!30E1.00<CR>

Read leading code setting is $#%@~* for module address 30 and change leading code **$** to **A**, then use A30F to read firmware version of module on address 30.

*** WARNING ***

We do not recommend users change the default setting of leading code.

A leading code change shouldd only be attempted when the command conflicts with other devices on the network.

5.4.20 Set Host Watchdog Timer

@Description

Set host watchdog timer, module will change to safety state when host is failure.

@Syntax

~(Addr)2(Flag)(TimeOut)00<CR>

~	Command leading code.
(Addr)	Address ID, range (00 - FF).
2	Set host watchdog timer and safe state value.
(Flag)	0 : Disable host watchdog timer
	1 : Enable host watchdog timer **(1-character)**
(TimeOut)	Host timeout value, between this time period host must send (Host is OK) command to module, otherwise module will change to safety state.
	Range 01 - FF. **(2-character)**
	One unit is 100 ms
	01 = 1 * 100 = 100 ms
	FF = 255 * 100 = 25.5 sec
(SafeValue)	8 channels safety value of digital output channels when host is failure. **(2-character)**

@Response

!(Addr)<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID

@Example

User command:	~30211200<CR>
Response:	!30<CR>

30	Address ID
2	Set host watchdog timer and safe state value.
1	Enable host watchdog timer.
12	Timeout value. 0x12 = 18
	18 * 100 = 1800 ms
00	

5.4.21 Read Host Watchdog Timer

@Description

Read host watchdog timer setting and the safety value.

@Syntax

~(Addr)3<CR>

~	Command leading code.
(Addr)	Address ID
3	Read host watchdog setting and module safety state value.

@Response

!(Addr)(Flag)(TimeOut)00<CR>

or

?(Addr)<CR>

!	Command is valid.
?	Command is invalid.
(Addr)	Address ID, range (00 - FF).
(Flag)	0 : Host watchdog timer is disable
	1 : Host watchdog timer is enable**(1-character)**
(TimeOut)	Host timeout value.
	Range 01 - FF. **(2-character)**
	One unit is 100 ms
	01 = 1 * 100 = 100 ms
	FF = 255 * 100 = 25.5 sec
00	

@Example

User command:	~303<CR>
Response:	!3011200<CR>

06	Address ID
1	Host watchdog timer is enable.
12	Timeout value. 0x12 = 18
	18 * 100 = 1800 ms
00	

5.4.22 Host is OK

@Description

When host watchdog timer is enabled, host computer must send this command to every module before timeout, otherwise **"host watchdog timer enable"** module' s output value will go to safety state output value.

@Syntax

~**<CR>

~	Command leading code.
**	Host is OK.

@Response

Note : Host is OK command has NO response.

@Example

User command: ~**<CR>

6

Software Utility

6.1   Software Installation

1. Load the All-in-One CD into your CD-ROM drive.
2. Select and open CYMOD.
3. Select and open the CYMOD 4000 Admin Utility.
4. Select the driver you want to install and follow the setup instructions on the screen.

6.2   How to Execute **CYMOD** Administration

Requirements:

1. At least one RS-232 communication port.

2. Microsoft Windows(version 3.1, 95/98/NT)

3. At least 2MB Hard Drive Space

4. A VGA monitor(optional)

5. Mouse (optional)

Execute the CYMOD Administration Utility

● **Run "CYMOD Administration Utility" Icon.**

6.3 **CYMOD** Administration Function Overview

Default RS-232 Communication Port Setting.

- Communication Port : **COM2**

- Baud Rate : **9600**

- Data Bits : **8**

- Stop Bits : **1**

- Parity : **None**

6.3.1 Change RS-232 Communication Port Setting.
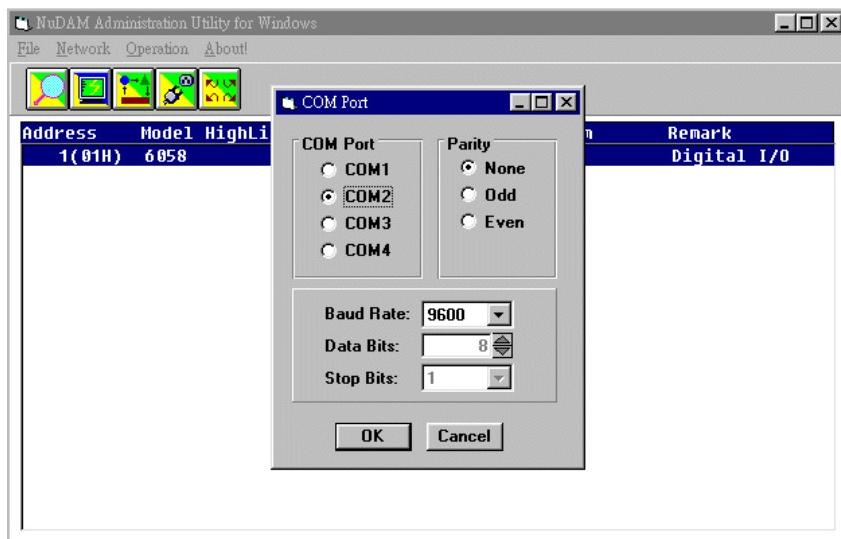
Choose "Network-ComPort" to change setting.

6.3.2 Search all exist CYMOD modules

Choose "Network-Search" to search all exist CYMOD modules in the current RS-485 network.
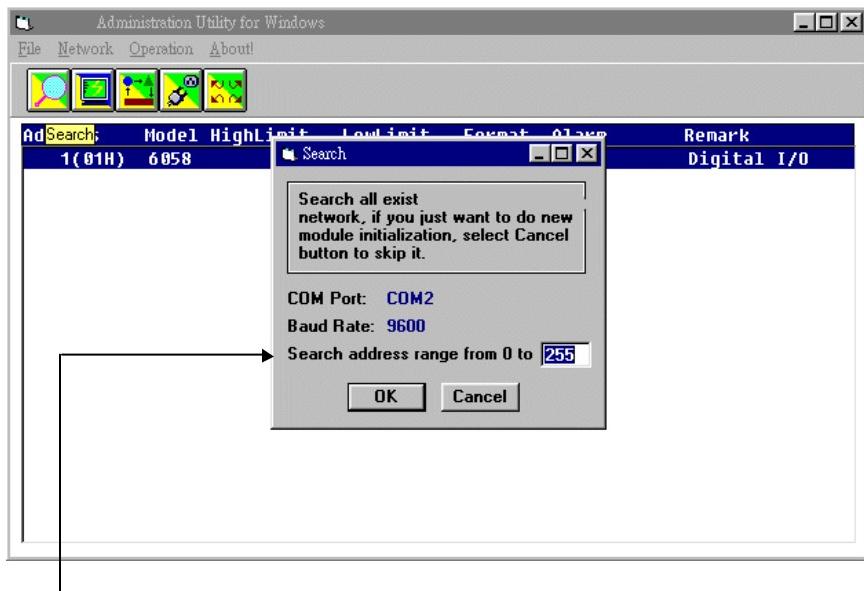
You can change search addresses range from here.

6.3.3 Using Operations

Operation-Terminal :   Terminal Emulation allows users to input commands and get a response message.

Operation-Configuration :   Select one exist CYMOD module and select Configuration to adjust this module' s common and private setting.

Operation-Monitor: Monitor all the module function on the network.

Operation-Diagnostic: Diagnostic module' s function.

Operation-Calibration: Some A/D modules need calibration

Operation-Model Number: Select Model Number
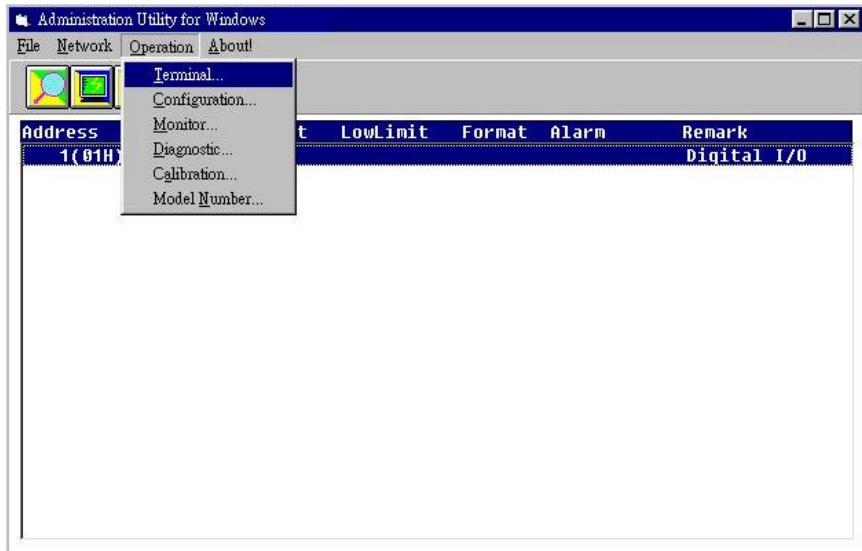
<u>T</u>erm   ICON for Operation-Terminal

You can control all modules remotely using command mode, or by testing your modules from this Terminal.
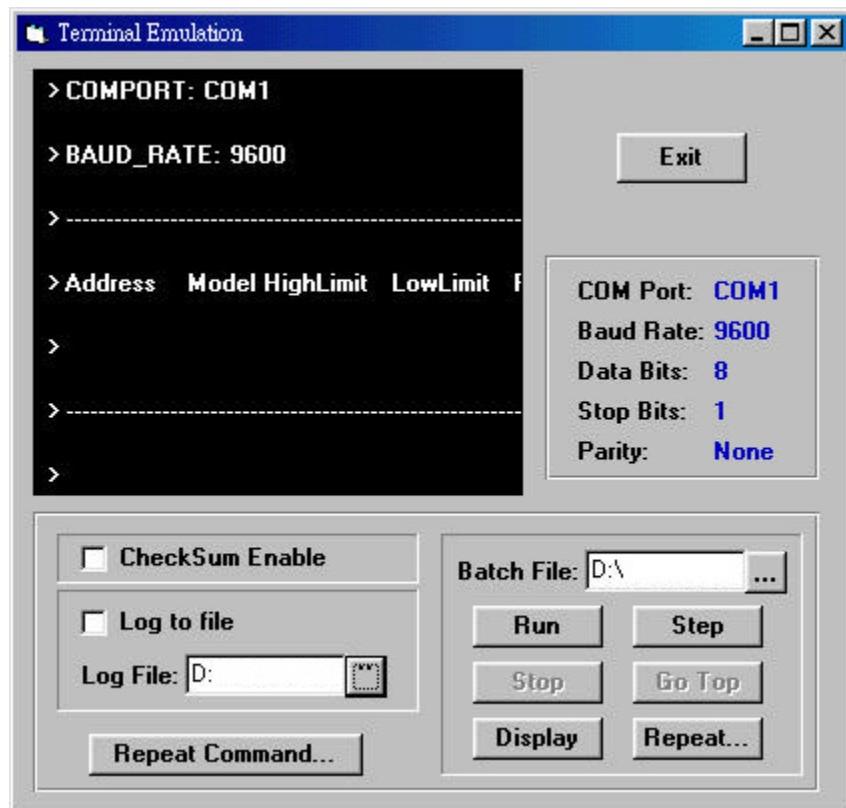
Operation-Run Batch :   Run batch command file in BATCH.CMD user can edit this text file.
Operation-Step Batch :   Run the batch command step by step.
Operation-Display Batch: Display content of BATCH.CMD
Operation-Repeat   :   Repeat one command n times

Diag   ICON for Operation-Diagnostic

This dialog is different by different-fuction modules.
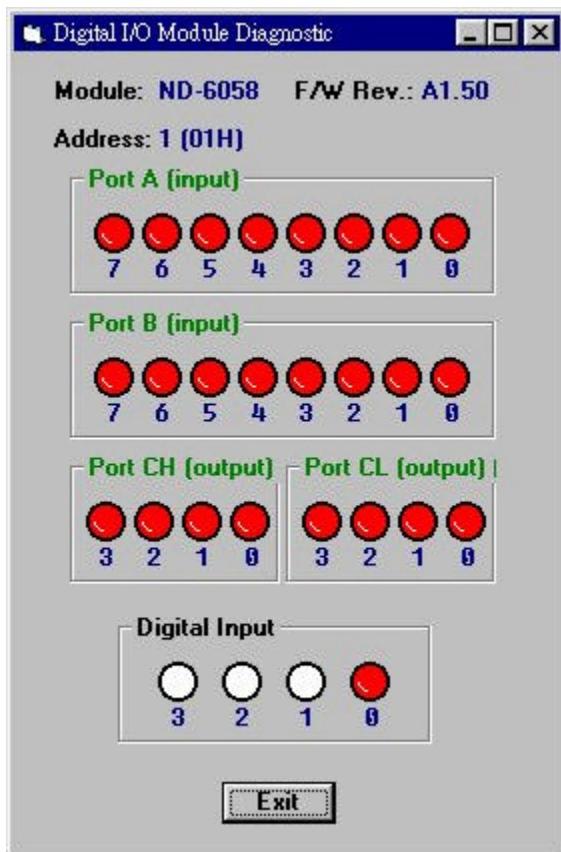
C<u>a</u>l   ICON for Operation-Calibration

This dialog is different by different fuction modules.
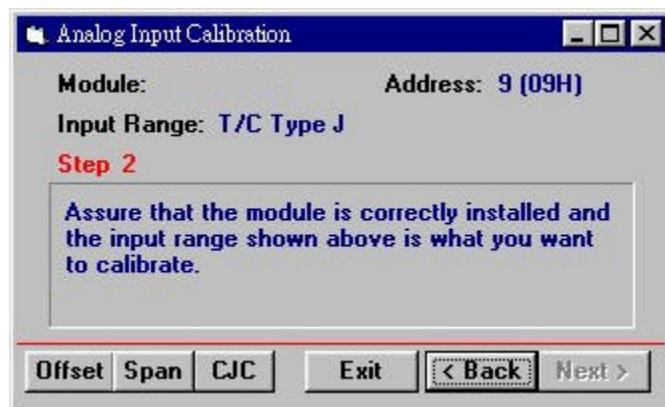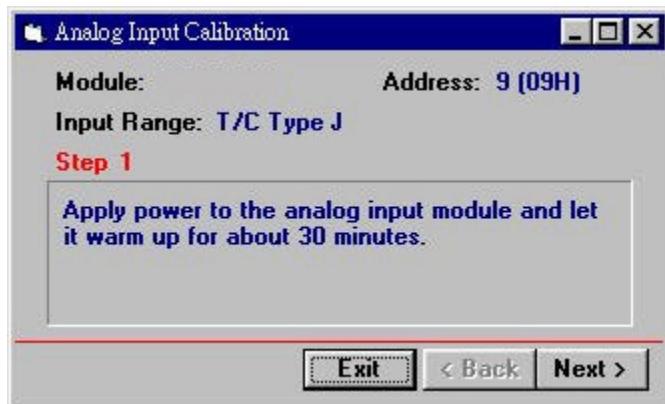
6.3.4 Save and Print CYMOD Module Information

File-Save : Save all exist CYMOD module information as displayed in the listbox in the current RS-485 network.

File-Print : Print the CYMOD module information in the listbox.

File-Exit : Quit the CYMOD Administration Utility.
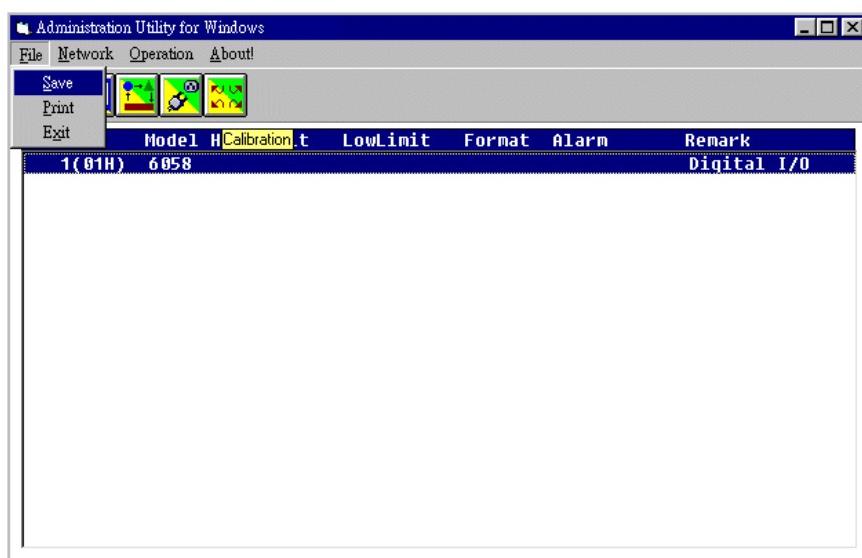
6.3.5 Version Information

Help-About   Version information
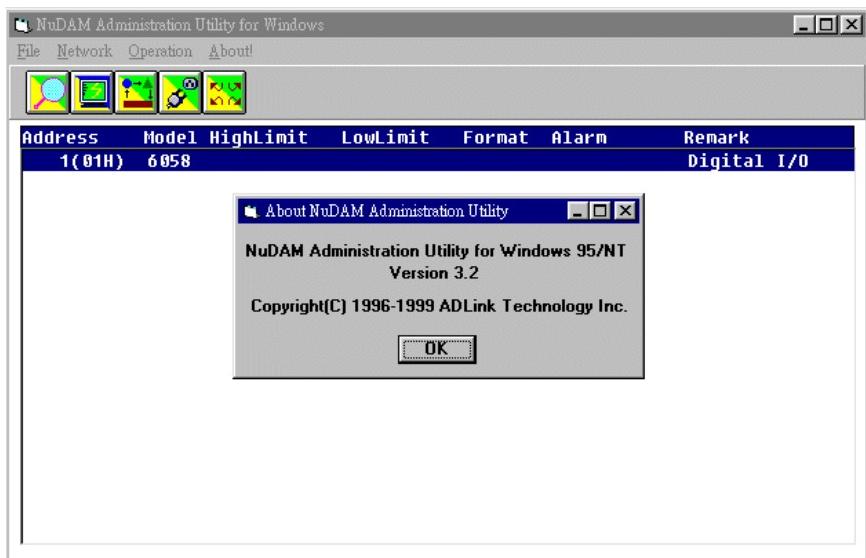
Troubleshooting and Maintenance

Preventive Maintain

● Periodically check for loose connections.

ATTENTION: To avoid electircal shock or unintended operation of the module, remove incoming power before checking connections.

Using the LED Indication

The LED provides status information on module operation.

LED	What it Means:	What to do:
OFF	Module is not receiving input power by loosing wiring.	Check module wiring, cable connections, and cable connections on terminal block.
ON(RED)	Normal receiving state.	No action required.
Flashing	Normal transmitting state.	No action required.

Other Malfunctions

Problem	What it Means:	What to do:
Do not function	Loose wiring Incorrect DIP switch setting	Check wiring and cable connection Check baud rate and data packet setting of the DIP switch.

Product Service

Diagnosis and Debug

CyberResearch, Inc. maintains technical support lines staffed by experienced Applications Engineers and Technicians. There is no charge to call and we will return your call promptly if it is received while our lines are busy. Most problems encountered with data acquisition products can be solved over the phone. Signal connections and programming are the two most common sources of difficulty. CyberResearch support personnel can help you solve these problems, especially if you are prepared for the call.

To ensure your call's overall success and expediency:

1) Have the phone close to the PC so you can conveniently and quickly take action that the Applications Engineer might suggest.

2) Be prepared to open your PC, remove boards, report back-switch or jumper settings, and possibly change settings before reinstalling the modules.

3) Have a volt meter handy to take measurements of the signals you are trying to measure as well as the signals on the board, module, or power supply.

4) Isolate problem areas that are not working as you expected.

5) Have the source code to the program you are having trouble with available so that preceding and prerequisite modes can be referenced and discussed.

6) Have the manual at hand. Also have the product's utility disks and any other relevant disks nearby so programs and version numbers can be checked.

Preparation will facilitate the diagnosis procedure, save you time, and avoid repeated calls. Here are a few preliminary actions you can take before you call which may solve some of the more common problems:

1) Check the PC-bus power and any power supply signals.

2) Check the voltage level of the signal between SIGNAL HIGH and SIGNAL LOW, or SIGNAL+ and SIGNAL– . It CANNOT exceed the full scale range of the board.

3) Check the other boards in your PC or modules on the network for address and interrupt conflicts.

4) Refer to the example programs as a baseline for comparing code.

Warranty Notice

CyberResearch, Inc. warrants that this equipment as furnished will be free from defects in material and workmanship for a period of one year from the confirmed date of purchase by the original buyer and that upon written notice of any such defect, CyberResearch, Inc. will, at its option, repair or replace the defective item under the terms of this warranty, subject to the provisions and specific exclusions listed herein.

This warranty shall not apply to equipment that has been previously repaired or altered outside our plant in any way which may, in the judgment of the manufacturer, affect its reliability. Nor will it apply if the equipment has been used in a manner exceeding or inconsistent with its specifications or if the serial number has been removed.

CyberResearch, Inc. does not assume any liability for consequential damages as a result from our products uses, and in any event our liability shall not exceed the original selling price of the equipment.

The equipment warranty shall constitute the sole and exclusive remedy of any Buyer of Seller equipment and the sole and exclusive liability of the Seller, its successors or assigns, in connection with equipment purchased and in lieu of all other warranties expressed implied or statutory, including, but not limited to, any implied warranty of merchant ability or fitness and all other obligations or liabilities of seller, its successors or assigns.

The equipment must be returned postage prepaid. Package it securely and insure it. You will be charged for parts and labor if the warranty period has expired.

Returns and RMAs

If a CyberResearch product has been diagnosed as being non-functional, is visibly damaged, or must be returned for any other reason, please call for an assigned RMA number. The RMA number is a key piece of information that lets us track and process returned merchandise with the fastest possible turnaround time.

PLEASE CALL FOR AN RMA NUMBER!
Packages returned without an RMA number will be refused!

In most cases, a returned package will be refused at the receiving dock if its contents are not known. The RMA number allows us to reference the history of returned products and determine if they are meeting your application's requirements. When you call customer service for your RMA number, you will be asked to provide information about the product you are returning, your address, and a contact person at your organization.

***Please make sure that the RMA number is
prominently displayed on the outside of the box.***

• Thank You •